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Results of Rolling from Green Ingots

Premature Charging Into Hot Reheating Furnace and the Large Internal Steel Structure Produced of Brittle Character

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It has often been asked what difference may be found in the physical properties of steel according to the condition of the ingot when charged into a hot reheating furnace for subsequent rolling and forging. The general rolling-mill practice is to put ingots into the furnaces while hot soon after the metal has solidified, yet at the same time irregularities and abnormal conditions exist which necessitate the charging of cold ingots; then again it frequently occurs, perhaps through carelessness, that ingots are charged before the central portions have been solidified.

In the charging of cold ingots and especially those of high carbon, there is much danger of shattering the structure because of the unequal expansion of the metal. We agree that the surface of a cold ingot charged into a hot reheating furnace expands very rapidly, producing tension on the structure in the central portion of the ingot to which the heat has not had sufficient time to penetrate. Not to discuss the theory of expansion of metals and the transformations which then take place, suffice to say that the power of expansion is unlimited and we need not wonder that shattering takes place. To reheat cold ingots and to avoid the shattering it is essential that the ingots be heated very slowly.

The term green ingot is applied to one in which when charged the interior or central portion has not had sufficient time to solidify. The temperature of the reheating furnace is generally high enough to keep the metal fluid within the ingot; in fact, the central portion of the larger ingots will remain fluid for several hours.

The original surface grain of the solidified portion of a green ingot while being rolled is reduced in size. The large structure of steel in the cast condition is broken up and the grain represents normal rolling. The central portion being still fluid and in motion during the rolling will show on cooling a very large grain structure, similar to that of an ingot which had not received any work—in other words, the structure will compare favorably with a casting cooled slowly and undisturbedly in the mold.

Fig. 1

Fig. 2

Fig. 5

Fig. 6

Fig. 3

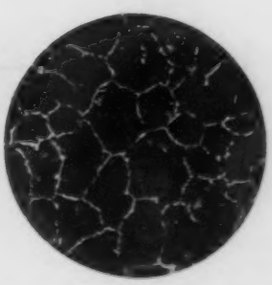


Fig. 4

Fig. 7

Fig. 8

The photographs may be compared in pairs. Figs. 2 and 5 are of blooms, from ingots properly solidified before rolling and green, respectively. Figs. 1 and 6 show rails rolled from corresponding blooms. Figs. 3 and 4 represent structure at surface and center of head of rail respectively in the one case and Figs. 7 and 8 represent structure at surface and rail head center in the other case.

If a green ingot, say 22 in. square and approximately 3 tons in weight, is rolled into blooms 8 in. square, an etching of the cross-section will show that the central portion of the bloom has a different appearance as to color from that of the outside portion. On the contrary, an ingot charged into a reheating furnace soon after the metal has been solidified and then rolled, or an ingot allowed to become cold and then charged and rolled, will show a uniform surface on etching, so far as grain size is concerned and provided the steel has no segregation. This difference of appearance in color in the resulting product of a green ingot will be manifest regardless of the etching medium. The explanation is briefly the wide difference in grain size. The small grain of the outside portion, reduced in the rolling, will be light, whereas the large and irregular grain of the central portion will be dark.

Again, provided the steel is not segregated, the chemical analysis of the surface and central portion of the bloom rolled from a green ingot will be practically the same; but as already stated there will be a vast difference under the microscope and a corresponding difference in the physical properties. As the charging of green ingots produces the unequal structure and as a large-grained structure is, other things being equal, weak, we have the first cause of many failures in certain finished products. No better example may be cited than finished rails, as no heat treatment is given the rails after having left the rolls.

The usual method to ascertain the first cause of trouble in a brittle rail is to have the rail analyzed for segregation, and if decided segregation is found, a conclusion is formed. If the chemical analysis shows no segregation, then a cross-section of the rail is polished and etched to determine soundness of the metal. Micro-sections are taken from the surface and center of the head. A comparison of grain size and grain structure of surface and center of head is carefully noted. In brittle rails, the structure in the center of the head is abnormally large, whereas the structure at the surface may be normal. The first cause of this irregular structure is generally attributed to initial reheating temperatures, soaking too long at high temperatures, or finishing temperature much too high. Aside from the large and irregular grain structure, the surface of the head frequently shows an outer carbonless band which is indicative of too long soaking at rolling temperatures. While the conditions mentioned have an influence on grain size and the outer carbonless band promotes excessive flowing of the metal on the surface regardless of the carbon content, it is equally true that the influence of charging green ingots is seldom considered and the first cause of much brittleness in steel is overlooked.

It is comforting to know that thorough annealing will refine the large and irregular grain structures and will make the structure homogeneous and hence eliminate much of the brittleness. In the case of rails annealing is not done and only rails sufficiently strong to meet the drop test are put into service, but they have structures unfit to withstand the alternating stresses to which the rails are subjected.

The accompanying prepared photographs serve to show the influence of normal and abnormal charging of ingots on the structures in finished rails. Fig. 1 is an etched cross-section of an 8-in. square bloom rolled from an ingot soon after the metal was solidified and represents normal charging. It is to be noted that the etched surface shows a uniformity of structure with no indication of segregation or unsoundness. Fig. 2 is an etched cross-section of a rail rolled from a bloom which showed a uniform structure with no indication of segregation or unsoundness. Figs. 3 and 4 represent structures at surface and center of head of rail respectively. Very little difference in grain size is to be noted. The photomicrographs represent structures at a magnification of 50 diameters. The grain is pearlite surrounded by a net work or cell wall of ferrite. The chemical composition of steel in this series of photographs is as follows: Carbon by combustion, 0.574 per cent; sulphur, 0.062 per cent; phosphorus, 0.058 per cent; manganese, 0.85 per cent.

Fig. 5 is an etched cross-section of an 8-in. square bloom rolled from a green ingot. The contrast in color previously referred to is clearly defined. Fig. 6 is an etched cross-section of a rail rolled from such a bloom. Here again may be seen the contrast in color. Figs. 7 and 8 represent structures at the surface and the center of the head of the rail respectively. The difference in grain size is readily seen. The photomicrographs represent structures at a magnification of 50 diameters. The chemical composition of steel in this series of photographs is as follows: Carbon by combustion, 0.635 per cent; sulphur, 0.069 per cent; phosphorus, 0.072 per cent; manganese, 0.91 per cent.

TO MAKE OWN INGOTS FOR GUNS

Tacony Ordnance Corporation Will Install Two Open Hearth Furnaces

The Tacony Ordnance Corporation, which was recently incorporated with $100,000 capital stock, to construct a gun-forging plant at Tacony, Pa., near the plant of the Tacony Steel Co., with which it is affiliated, has closed contracts for the purchase of a 22-acre site and will commence construction of buildings very soon. Two 50-ton open hearth oil-burning acid furnaces will be built in addition to a forge shop and a machine shop. The capacity of the plant will be two gun sets per day. Rough machining only will be done. The concern will make exclusively forgings with 9.5-in. bore, having received the largest contract the United States Government has yet awarded for gun forgings. It will take four to five months to complete the plant ready for operations. Equipment will be purchased within the next two weeks. Twenty-one cranes, including a 60-ton ladle crane and a special crane for dipping forgings into an oil bath, will be required, as well as about 50 machines for the rough machining. George Satterthwaite, formerly general superintendent of the Midvale Steel & Ordnance Corporation, has joined the Tacony Ordnance Corporation as vice-president and general manager. J. B. Warren is president of the company. A New York office is maintained at 50 Church Street.

The statement in THE IRON AGE that the Standard Steel Castings Co., Cleveland, would forge guns for the Government should have read Standard Steel Works Co. The latter concern is completing additions to its plant at Burnham, Pa., and will forge 6-in. howitzers and also do the rough machining. New equipment has been purchased.

The Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has purchased equipment for its Tioga plant, Philadelphia, where gun forgings will be made and rough machined.

Thus far five concerns have been given contracts by the Government for gun forgings. In addition to the three above mentioned are the Heppenstall Forge & Knife Co., Pittsburgh, and the Buckeye Steel Castings Co., Columbus, Ohio.

Several new projects are under consideration for the finishing of these guns. It is understood that some rough-bored forgings will be sent to France for machining in plants in that country.

Improved Elevating Industrial Truck

A new type of elevating platform storage battery truck for use in manufacturing plants, having various refinements and improved features in its mechanical design, has been brought out by the Elwell-Parker Electric Co., Cleveland, Ohio. In the place of the double reduction spur gear drive used on previous types for propelling, the driving motor is directly connected to a single worm reduction on a four-pinion bevel differential, eliminating loss in the power transmission. The driving axle is of the full floating type. For the chain drive, previously employed to elevate the platform, a simple worm and screw lifting device is provided.

The lifting mechanism is operated by a separate motor located close to the platform. The lift of the platform has been increased to 4½ in. Attention is called to the importance of this feature, as the higher lift puts the load up above floor obstructions and proves an advantage in crossing door sills, rails and uneven floors or yards. The lifting mechanism runs at slow speed in oil and is said to need attention only once or twice a year. The entire elevating mechanism can be taken out if desired. In lifting, a switch is closed by hand, after the truck is driven beneath the separate loading platform, the motor starts and the platform moves upward. When the platform reaches its upper or lower limit a tripping device opens the motor switch, stopping the motor. Another improvement in the lifting mechanism is that the upper or downward movement of the platform may be stopped at any point. This feature is provided to prevent damage, should the platform or its contents catch an obstruction while being raised or lowered.

The propelling and elevating motors are specially designed to perform their respective functions, and both are inclosed. The storage battery is carried in a covered compartment on top, close to the controller and above the propelling motor. A spring brake is located between the motor and axle, being operated by the driver releasing his weight on one pedal forming half of the operating platform. It is stated that the brake is capable of stopping the truck in its own length under all conditions of load and speed. The circuit breaker or connection between the controller and battery is actuated by the weight of the operator on a second pedal. The circuit breaker is interlocked with the controller, and will not close except when the latter is in off position. Therefore, no fuse is required and the motor will take the full battery power. The brake and circuit breaker are operated independently so that the truck can be started on the incline without fully releasing the brake. The controller returns to the neutral position when the handle is released, affording the operator complete protection under both normal conditions and in emergencies.

The truck is steered through the four wheels by a lever which is adjustable for the operator's height. The steering tierods and knuckles are located so that the difference in wheel angularity is compensated for, giving concentric steering when turning to the right or left. The levers are bushed and the pins are hardened and ground and held rigid in steering links. The steering knuckles are located over the tire center lines to make the steering easy. The front axle supports the frame and mechanism on heavy coil springs, and the driving shafts carry no weight and are removable.

The truck is made in two heights to meet requirements. The lower one has wheels with 3½ x 21½-in. demountable rubber tires in front, and 5 x 10½-in. rubber tires in the rear. The higher truck has larger wheels and is designed for yard work. The width of the truck has been reduced 2 in. as compared with former models, making it more convenient for operation around corners and in narrow aisles and in elevators. It can be used as a tractor as well as a truck. A push button bell alarm or a mechanical horn is provided. All parts are of steel and interchangeable. Lead or nickel steel batteries of standard types are furnished with a capacity to perform a day's work when traveling 10 to 20 miles.

Worm Gearing Has Replaced Spur Gearing and the Chain Drive for Truck Propulsion and Platform Elevation in a New Storage Battery Vehicle for Use in Industrial Establishments

Table of Tap Drill Sizes

The Lufkin Rule Co., Saginaw, Mich., has brought out a reference table of tap drills for machine screw taps. It is a piece of flexible spring steel, 1 7/32 in. wide and 6¾ in. long. On one side are given the machine screw tap sizes, followed by the tap drill size number and its decimal equivalent and the corresponding body drill size number and its equivalent. A complete set of decimal equivalents of 64ths of an inch is given on the other side and at the bottom is an inch graduated into 64ths.

The Metal Products Co., maker of twist drills, taps, and reamers and brass, copper and aluminum products, has removed from the Kinney Building, Newark, N. J., to 32 Broadway, New York.

Child Labor Law a Radical Departure

Federal Judge Declared It Unconstitutional, but New Act Is in Force in All Other Districts— Federal Officials Believe It Will Be Sustained

WASHINGTON, Sept. 4.—Very careful examination should be given by manufacturers and dealers in all parts of the country to the statute which became effective on the first instant "to prevent interstate commerce in the products of child labor" and to the regulations thereunder which have just been promulgated by a board consisting of the Attorney General, the Secretary of Commerce and the Secretary of Labor. The new law is an extraordinary statute which seeks in a manner never heretofore attempted to utilize the power of Congress to regulate interstate commerce for the purpose of exerting a form of police control over a subject which heretofore has been regarded as wholly within the jurisdiction of the several States.

The constitutionality of the new law has been seriously questioned by some of the ablest lawyers in and out of Congress, and last Friday at Greensboro, N. C., Federal Judge James E. Boyd of the western district of North Carolina held the act unconstitutional, enjoining the United States district attorney from enforcing its provisions in that district. The decision was in a case brought to restrain a cotton mill company from discharging two minors. Judge Boyd held that Congress had exceeded its power in attempting the regulation of local conditions. Congress, he said, could regulate trade among the states but not the internal conditions of labor. The case will, of course, be taken to the Supreme Court of the United States and unless other courts should take similar action, the statute will continue in force in all districts except the western district of North Carolina. The Federal officials at Washington regard the decision merely as a vehicle for getting the law before the Supreme Court and they are entirely confident that the action of Congress will be sustained.

Provisions of the Law

The new statute, known as the Keating-Owen act, provides that "no producer, manufacturer, or dealer shall ship or deliver for shipment in interstate or foreign commerce any article or commodity the product of any mine or quarry, situated in the United States, in which within 30 days prior to the time of the removal of such product therefrom, children under the age of 16 years have been employed or permitted to work, or any article or commodity the product of any mill, cannery, workshop, factory, or manufacturing establishment, situated in the United States, in which within 30 days prior to the removal of such product therefrom children under the age of 14 years have been employed or permitted to work, or children between the ages of 14 years and 16 years have been employed or permitted to work more than eight hours in any day, or more than six days in any week, or after the hours of seven o'clock postmeridian, or before the hour of six o'clock antemeridian." For the purpose of securing the enforcement of the act the Secretary of Labor or anyone duly appointed by him is authorized to enter and inspect at any time mines, quarries, mills, workshops, factories, manufacturing establishments and other places in which goods are produced or held for interstate commerce, and it is made the duty of each district attorney to whom the Secretary of Labor shall report any violation of the act to cause appropriate proceedings to be commenced and prosecuted in the United States courts. Anyone violating the provisions of the act is liable to a fine upon first conviction of not more than $200, which is increased for each subsequent offense to not more than $1,000, or to imprisonment for not more than three months, or both.

Guaranty Required

Inasmuch as the letter of the law renders a dealer equally liable with the manufacturer for the interstate shipment of goods made by child labor, the framers of the statute have provided for the protection of the former by stipulating that he shall procure from the producer a guaranty "issued by the person by whom the goods are delivered for shipment or transportation were manufactured or produced, resident in the United States, to the effect that such goods were produced or manufactured in a mine or quarry in which within 30 days prior to their removal therefrom no children under the age of 16 years were employed or permitted to work, or in a mill, cannery, workshop, factory, or manufacturing establishment, in which within 30 days prior to the removal of such goods therefrom no children under the age of 14 years were employed or permitted to work, nor children between the ages of 14 and 16 years employed or permitted to work more than eight hours in any day or more than six days in any week or after the hour of seven o'clock postmeridian or before the hour of six o'clock antemeridian; and in such event, if the guaranty contains any false statement of a material fact, the guarantor shall be amenable to prosecution and to the fine or imprisonment provided by this section for violation of the provisions of this act." The guaranty provision of the new law has already been fully tested in connection with the pure food and drug statute which contains a similar proviso for the protection of wholesalers and retailers.

Troublesome Feature

In view of the broad scope of the new law, which covers every possible line of production or manufacture, it is probable that at the outset there will be a very general demand on the part of dealers for guarantees covering goods produced in mines or factories in which minors are employed in any capacity, whether within the prohibition of the statute or not. In this connection a vexatious feature of the regulations for the enforcement of the act provides that the guaranty to protect the dealer from prosecution "shall be specific, covering the particular goods shipped or delivered for shipment or transportation, and shall not be a general guaranty covering all goods manufactured or produced or to be manufactured or produced by the guarantor." The guaranty may be incorporated in or attached to or stamped or printed on the bill of sale, bill of lading or other schedule that contains a list of the goods which the manufacturer or producer intends to guarantee. Under the pure food and drug law, manufacturers are permitted to file with the Secretary of Agriculture a single general guaranty under which all dealers are automatically protected against prosecution, but for some unknown reason the departmental board which has drafted the regulations has rejected this plan in favor of the drastic regulation of a special guaranty to accompany each lot of goods. This will make it necessary for the complete protection of the dealer that he shall preserve indefinitely a large volume of bills of lading, invoices or separate guaranties received by him from producers.

Form of Guaranty

As the law does not require manufacturers to furnish guaranties but imposes upon dealers the duty of procuring them for their own protection, it has been deemed advisable by the departmental board to provide forms which comply with the requirements of the act, as follows:

For products of mines or quarries:

(I or we), the undersigned, do hereby guarantee that the articles or commodities listed herein (or specify the same) were produced by (me or us) in a mine or quarry in which within 30 days prior to removal of such product therefrom no children under the age of 16 years were employed or permitted to work.

(Name and place of business of producer or manufacturer.)

(Date of removal.)

For products of a mill, cannery, workshop, factory or manufacturing establishment:

(I or we), the undersigned, do hereby guarantee that the articles or commodities listed herein (or specify the same) were produced or manufactured by (me or us) in a (mill, cannery, workshop, factory, or manufacturing establishment) in which within 30 days prior to the removal of such product therefrom no children under the age of 14 years were employed or permitted to work, nor children between the ages of 14 years and 16 years were employed or permitted to work more than eight hours in any day or more than six days in any week, or after the hour of 7 o'clock p. m. or before the hour of 6 o'clock a. m.

(Name and place of business of producer or manufacturer.)

(Date of removal.)

Producers and manufacturers may protect themselves by requiring minor employees to produce certificates of age. In States having child labor laws requiring employment, age or working certificates or permits to be issued, such documents given under State authority will be recognized as meeting the requirements of the new Federal statute. In other States, Federal age certificates must be procured from officials hereafter to be designated by the departmental board for children between 16 and 17 years of age when employment in mine or quarry is contemplated and for children between 14 and 16 years of age when the employment is to be in mill, workshop, factory or manufacturing establishment.

Manufacturers are required to keep time records showing the hours of employment for all children between 14 and 16 years of age, whether employed on a time or a piece-rate basis. Children of the ages covered by the statute may not be employed for more than six consecutive days. W. L. C.

Dead Front Type of Plug Switch

Safety in making or breaking circuits carrying small currents at comparatively high voltage is the feature emphasized by the General Electric Co., Schenectady, N. Y., for a line of dead front plug switches which it has brought out. The switches are an improvement on the older design. In the new type of switch the current carrying leads are attached to the outer ends of the receptacle and the parts accessible from the front of the panel are dead when the plug is not in place, a feature of design which gives the switches their name. In the older type the line connections ran to the inner end of the receptacle and the parts protruding through the panel were alive.

The change in design is supplemented by the use of more insulation and a larger handle on the plug. Until the switch has opened sufficiently to break the circuit, there is only a slight chance of touching parts of the switch which carry current. In general the double plug switch follows the design of the single-plug one as regards the use of tube installation and metal parts, etc., but each complete switch consists of two tubular receptacles and a two-plug double-break switch per pole. These switches also have thick, wide cross bars which are designed to act as a guard and afford additional protection. Both single and double break types can be supplied, the special fields for which they are used being on both the primary and secondary sides of constant current transformers in connection with series lighting circuits and occasionally on small capacity feeder circuits where the voltage does not exceed 2500 volts.

The Swedish Crucible Steel Co., Detroit, Mich., announces that it will shortly begin an addition to its foundry that will more than double its present capacity. A new 2-ton converter will be installed. The company has other extensions well under way, including an addition to its machine department and a new finishing and cleaning department.

The Superior Tool Co., Dayton, Ohio, recently granted a charter, with a capital of $10,000 will engage in the manufacture of tools and special machinery. H. W. Miller is president and general manager, and W. E. Watson is secretary and treasurer.

REQUIREMENTS OF SILICA BRICK

Strength and Spalling Losses Related to Size of Ganister—Causes of Failure

The influence on the physical properties of silicon bricks of pressure and degree of fineness of material used in their manufacture was studied by C. E. Nesbitt and M. L. Bell. The results of this study and of related tests were described in a paper presented before the American Society for Testing Materials at Atlantic City, June 26, of which the following is a summary:

Two very important properties of first-class silica brick are mechanical strength and resistance to spalling. The strength as indicated by impact tests is greatest when finely ground ganister is used while the loss by spalling increases with fineness of mesh. Hence a mesh must be selected at the expense of one of these properties. As more is gained by a coarse mesh a coarsely ground material is advocated.

The average spalling loss for hand-made silica brick is about 30 per cent. Power-pressed silica bricks were made with the same spalling loss from 4-mesh material pressed at 1500 lb. per square inch. These bricks were true to shape, sharp-cornered, dense and had smooth, marble-like surfaces. Molding defects such as soft corners, sponginess, improper slicking and lack of cohesion were all eliminated. The prospect of the adoption of power pressing as a step towards better and more uniform silica brick was clearly brought out. The idea of power pressing is not entirely new, yet little has been done in a commercial way. One of the large concerns is now manufacturing brick this way on a commercial basis. The average spalling loss of these bricks is 25 per cent.

In actual service, although well guarded as far as practice and construction will permit, silica brick fail from three primary causes: spalling, crushing, and slagging. These cannot be entirely eliminated, but by a deeper study of the manufacturing of brick they can be reduced to a minimum. An ideal brick must be well molded, true to shape, thoroughly bonded, and of good mechanical strength.

A visual inspection of almost any shipment will show at least 20 per cent of defective brick. Six shipments of brick of different brands brought out the fact that 60 per cent of the defects were due to molding, 30 per cent to fire cracks, and 10 per cent to improper setting and irregular shapes. These defects can be largely overcome in the present method of manufacture by careful inspection and rejection of the improperly made bricks at certain points in the manufacture.

The ganister must be carefully selected, and sorted, all rock that is soft or which carries considerable iron, clay, sandstone or other foreign matter should be rejected. The ganister selected should be ground to just pass a 4-mesh screen, care being taken to avoid an excessive amount of finely ground material. To insure uniformity, frequent sieve tests of the mud should be made. To secure a sufficient bond, 1.75 to 2 per cent of lime should be used. To avoid irregular shapes and molding defects, 9 to 11 per cent of water should be used for hand-made bricks and the material should be pounded into the mold. The bricks should be thoroughly dried so as to avoid fire cracks when placed in the kiln. Great care should be used when heating, especially during the first part of the burn, to prevent fire cracking. This applies also to the cooling. The bricks as they are removed from the kiln should be carefully inspected, and all bricks showing molding defects, fire cracks and irregular shapes should be rejected.

The consumer should be allowed to inspect the bricks before they are loaded on the car and a place should be provided for storage of such brick as he may desire to test.

The Thew Automatic Shovel Co., Lorain, Ohio, is filling war orders for shovels and unloading cranes for the French and British Governments.

Boiler Design for Gas-Fuel Economy

Multiple Bunsen Burners and Special Baffling Insure Complete Combustion and High Operating Efficiencies

IN a paper which he read before the Engineers' Society of Western Pennsylvania, and which is summarized below, J. C. Hobbs, assistant to the superintendent of power stations, Duquesne Light Co., Pittsburgh, described salient features of a boiler plant using gas fuel. He claims high efficiencies which he attributes to a burner giving correct mixtures of air and gas under all conditions of operation and to baffling to reduce the draft loss through the damper and to provide a long path for the gases.

The plant, which is designed for heating purposes, is located under the William Penn Hotel, Pittsburgh, and has a capacity of 4000 to 5000 boiler horsepower. Service is maintained 24 hr. of the day and 12 months of the year to take care of buildings which, in addition to heat, require hot water or have ice machines. The load factor, or ratio of the average demand to the maximum demand, is 25 per cent for heating service only.

Horizontal and Vertical Baffles

The first two boilers installed were of the longitudinal type and were baffled with a special vertical baffle built of a high temperature cement. The economy obtained was good at first, but it was soon found that the cement was falling out and the stack temperatures were going up.

The reason that the standard three-pass baffling was not used is that with gas fuel a very small intensity in the furnace is required. Instead of reducing the draft intensity by damper regulation, it was decided to draw the gas over a longer path and to impinge it against the tubes at a higher velocity so more heat would be extracted from the products of combustion, and a higher efficiency obtained.

Later two boilers of the cross-drum type with horizontal baffles were installed. On account of the chances of forming a dirt pocket at the rear of the second pass their settings are not recommended for coal, but horizontal baffling has been used quite successfully with and without the addition of some device or arrangement for the removal of dust from the pockets. The simplicity and ease of installation and renewals make this type particularly attractive.

Burner Design for Economy

The design of the furnace for gas was determined almost entirely by the conditions present in this particular installation. The burner being most important to combustion, most of the investigation was spent on it. Pittsburgh designs were entirely discarded and only the basic principle of the burner design found in West Virginia was used. The reasons why the commercial burners now on the market were not used are:

The air and gas could not be easily controlled with any degree of certainty.

At low ratings or with low gas pressure, trouble from "burning back" is experienced.

When the burner is shut off, all of the air cannot be shut off, most of the burners having a secondary supply of air to prevent the end of the burner from being burned.

The secondary air principle is wrong, and tests of the mixing feature of the burners themselves, by the use of smoke and bridge wall temperatures, showed that the air through the center of the burner was really a cold core and the stream lines were not broken up.

The initial cost of the commercial types is prohibitive and the cost of renewals is high.

In the design an endeavor was made to overcome all of the above objections and, up to date, the results have shown that it is a success. The points on which stress was laid were the control of gas and air and the thoroughness of their mixing before entering the furnace without allowing the flame to flare back. Both the air and gas are under the operator's control, and though the gas and air are kept separate to within a few inches of the furnace an intimate mixture is obtained.

Control of Combustion Mixture

No attempt was made to make the gas and air control entirely automatic, for it has been found that the time required for gas and air adjustments is small and it is believed the advantage of simplicity is sufficient to offset the cost of hand operation.

The adjustments for the correct ratio of gas and air are determined by use of a single "U" tube. This is connected to the gas chamber between the control valve and the mixing nozzles. The correct position of the air damper has been determined by special and operating tests and for the sake of simplicity the damper is marked so its position is indicated by the same figure which represents the gas pressure. The air supply is determined by the position of the air damper, as the drop in pressure from the boiler room to the furnace is maintained constant at 0.10 in. of water. This figure was a compromise between a high draft loss through the burner with the disadvantage of increased leakage loss through the setting, and a very low draft loss which changing slightly would cause excessive changes in the air supply.

The Combustion Chamber

The brick work is simple. The side walls are plain, but contain insulating brick between the fire brick and the red brick and no checker work is used. With vertical baffles the bridge wall, which was pushed back to give more combustion space, was reinforced by a series of V-shaped pilasters, giving more contact surface to the flame and assisting the mixture of gases. With the horizontal baffling a medium height bridge wall slightly raised in front of each burner is used.

It would seem with gas fuel that usual figures of cubic feet of combustion space per horsepower for complete combustion are all too high, and it is doubtful whether the question of volume is very important. The two controlling factors of combustion are temperature and mixture. Mixture is the one which must be given most consideration. If a gas pipe two or three inches in diameter were opened directly into the furnace, it is likely that the flame would extend almost entirely through the different passes of the setting, because the mixing would be very poor. If, on the other hand, the whole front of the furnace were composed of Bunsen burners, it is likely that the combustion would be completed within a few inches and certainly within two or three feet of the burners. These are extremes, but illustrate the principle. The burner adopted is in reality a multiple Bunsen burner.

Economy of Operation

The plant is not very old, but regular operating performance has proved there is merit in the installation. The average monthly efficiency obtained in actual operation from October, 1916, to and including April, 1917, follow. These data are in one sense the result of a continuous test. A statement is made up every eight hours showing the essential facts for that period. Every pound of water to the boilers is weighed, every pound of water blown or allowed to leak through the blow-down is weighed and deducted, and every cubic foot of gas is metered. Even the radiation from the pipe lines within the plant is charged to the boilers and every pound of this is deducted from the output.

Months	*Average efficiency Per cent*	*Months*	*Average efficiency Per cent*
October, 1916	78.9	February	83.5
November	77.2	March	78.0
December	78.4	April	78.2
January, 1917	85.2		

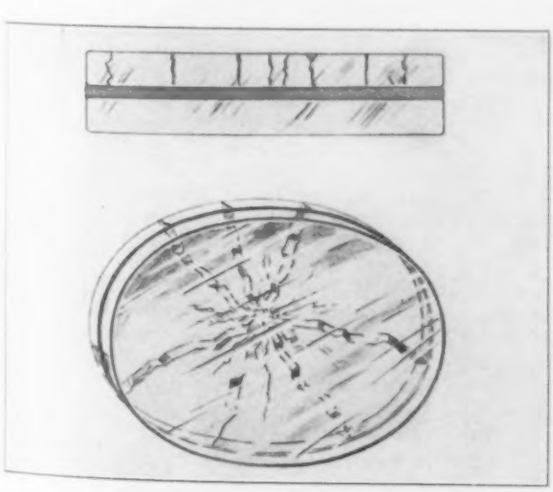
Gas analyses are not made continuously or even periodically because with the positive burner arrangement they do not seem necessary. In tests to determine the best burner arrangement the analysis was: CO_2, 11.4 per cent; CO, 0.0 per cent; O_2, 0.9 per cent; N, 87.7 per cent. When an attempt was made to further reduce the air CO began to form. The percentage of CO_2 seems low but the theoretical maximum is only a little over 12 per cent.

During the months of October to April, inclusive, the average monthly efficiencies were never lower than 77 per cent and some times as high as 85 per cent. These efficiencies do not appear very high when compared with guarantee figures for coal (which allow for ash pit losses) of 73, 75 or 76 per cent at the most economical load, but neither do they represent a few hours or even a day but are the averages covering a whole month. They are what has actually been accomplished by the regular operators who attend to other matters beside economy.

A Safety Goggle with Special Lenses

A special form of crystal which can be cracked but, it is emphasized, will not splinter, is a special feature of a safety goggle that has been placed on the market by Strauss & Buegeleisen, 37 Warren Street, New York. The goggles are designed for use by machinists, welders and other artisans, and a number of orders have been placed for crystals for use in aviation goggles for the army and also for military gas masks. Aside from the non-splintering feature, clouding up due to moisture condensation is claimed to be eliminated.

The lenses used in the goggles are made up of two layers of optical glass with an interposed layer of celluloid, all of which is welded into a solid mass. In this way, it is claimed, the crystal possesses the virtues of ordinary glass with none of the drawbacks, while at the same time it has the strength and safety features of the celluloid goggles, in addition to being rigid and fireproof. The celluloid layer provides a heat insulating medium which serves to prevent the clouding up due to moisture condensation. It is stated that even though the lens may be broken by a hammer blow, there is no flying of splinters to jeopardize the eyesight of the wearer and the crystal remains perfectly gas and water tight.

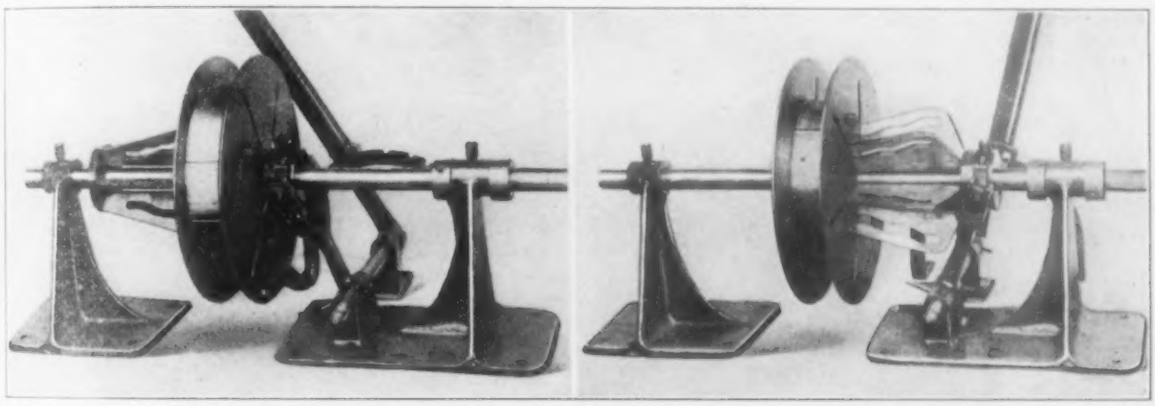


The Lenses of a Recently Developed Safety Goggle Consist of Two Pieces of Glass with a Strip of Celluloid Interposed, the Whole Being Welded into a Solid Mass Which Can Be Cracked but Will Not Break

A New Type of Variable Speed Pulley

A variable speed pulley in which gearing has been eliminated has been developed by W. B. Dunbar, Sydney, Australia, and Charles M. Terry, Inc., 25 Broad Street, New York, is acting as the American representative. Among the advantages claimed for the pulley are a reduction in the number of parts employed to provide the speed variation and the adaptability of the pulley for governing the speed of a heavy stamping press or delicate mechanisms. It is also possible to vary the velocity ratios between the driving and driven shafts at will without interrupting the transmission of power. A flat belt is employed, which fact is also emphasized.

The pulley consists essentially of a pair of flanges, a set of segments and six notched vanes. The segments are of two types, one which is known as the spring segments forming the first or smaller diameter, with the master segments located underneath. The latter work between fixed flanges, the vanes sliding through them. The vanes have guide slots in which a roller engaging in the body of the segments travels to produce the expansion or contraction. In this way, it is pointed out, the pulley retains a true circumference at any diameter. While the vanes in the pulley illustrated have notches in the slots these can be dispensed with and the slots given a perfectly straight outline, thus providing for minute variations in speed where such are desirable. At the same time, the notches enable definite changes to be secured readily.



Increasing or Decreasing the Diameter of the Pulley over Which a Flat Belt Runs by Moving the Vanes In or Out Changes the Speed of the Shaft

While the pulley illustrated is operated by a lever and notched quadrant, other operating arrangements can be provided, such as a handwheel or a short lever. In one installation that has been made in Australia a chain running over a set of sprocket wheels is the means employed.

The National Safety Council, which will hold its annual meeting in New York in the week of Sept. 10, has had, according to W. H. Cameron, general manager, an increase in membership of 68 per cent in the past year. There are now 3293 members, with 15,400 representatives and 4,500,000 workmen. Starting four years ago with one salaried official, it now has a staff of 20. Over 5,000,000 bulletins on safety subjects were mailed in the year. There have now been established 33 State and local organizations.

NEEDS ARE STUPENDOUS

Estimates of Appropriations Rapidly Increasing—The Liberty Loans

WASHINGTON, Sept. 4.—New estimates raising the cost of the war and the maintenance of the Government for the current fiscal year to the stupendous total of $21,000,000,000, the framing of a new bond and certificate bill authorizing new issues aggregating $11,538,000,000, the announcement of a new $3,000,000,000 liberty loan, the recasting on a much higher scale of the excess profits tax by the Senate Finance Committee in deference to sentiment aroused by the radical wing of the Senate, and the serving of notice on behalf of a large contingent of House members that a last ditch fight will be made to secure the authorization of a joint committee to supervise the colossal current expenditures, have been the salient developments of the past week in the financing of the war. Taken together they foreshadow a practically continuous session of Congress far into next summer with a possible short recess of a few weeks beginning early in the coming November.

The new estimates of expenditures for the year ending June 30, next, as presented by Secretary McAdoo to the Ways and Means Committee, have been accepted without a question notwithstanding the fact that they are several billion dollars in excess of figures laid before the committee less than a fortnight ago. The extent to which the Treasury is planning to finance the Allies is disclosed in Mr. McAdoo's memorandum, showing loans past and prospective for the current year aggregating $7,000,000,000, a full third of the nation's total expenditures. Disbursements on account of the war are figured at $10,750,000,000, current maintenance of the Government at $1,300,000,000, and margin of safety to meet unforseen emergencies, $2,000,000,000. Treasury officials and Congressional leaders agree that this margin of safety is none too great and point to such enormous unexpected supplemental estimates as $1,000,000,000 for the Shipping Board, $640,000,000 for airplanes, and $350,000,000 for additional destroyers, all of which have been presented to Congress without warning during the past 60 days.

The project of the House leaders, who are closely following the suggestions of the Treasury Department, contemplates the raising of the revenue to meet these fabulous disbursements from the following sources: Sale of bonds for the Allies, $7,000,000,000; pending war revenue bill, $3,000,000,000; war certificates $4,000,000,000; war savings certificates, $2,000,000,000; bonds for domestic purposes already authorized, $2,000,000,000, and regular revenue receipts, $1,300,000,000. It will be noted that the estimate of the revenue producing capacity of the war revenue measure is increased $1,000,000,000 above the House draft and a substantially larger amount above the original Finance Committee draft, but changes recently made in the Senate are counted upon to close the gap and produce not far from $3,000,000,000.

The Ways and Means Committee has promptly framed and reported the war bond and certificate bill recommended by the Treasury Department and carrying $11,538,000,000. The bonds authorized by this measure are to bear 4 per cent interest and together with certificates of indebtedness and war savings certificates are to be subject at least to income supertaxes but not to normal income or war profits tax. The interest rates on the certificates of indebtedness and war savings certificates are to be fixed by the Secretary of the Treasury and are likely to fluctuate in accordance with the money market. The Treasury Department is prohibited from selling foreign bonds taken in exchange for loans at less than their purchase price and the Secretary of the Treasury is required to exact interest from banks in which deposits are made of moneys accruing from the sale of bonds or certificates. Approximately $20,000,000 will be allowed the Treasury Department to be expended in floating all bonds and certificates authorized by the new measure.

The decision to increase the interest rate on the new bonds, which will include the forthcoming second "Liberty" loan, and to subject them to income surtaxes has been reached as the result of an exhaustive investigation made by Treasury experts to determine the extent to which the first issue of bonds has been utilized by wealthy individuals and by corporations to escape taxation. It is said to have been discovered that a number of large corporations having a part of their surplus invested in municipal, public utility, railroad and other bonds sold those securities and purchased large blocks of "Liberty" bonds and that many individuals of large wealth disposed of preferred stocks and other investments paying as high as 7 per cent and purchased bonds with the proceeds, one person investing in this manner as much as $60,000,000. As the income tax schedule of the war revenue bill as passed by the House and accepted by the Senate imposes a tax of 45 per cent on incomes in excess of $1,000,000, it is obvious that a 3½ per cent bond, free of all taxation, is a more attractive proposition than a 7 per cent preferred stock subject to the 45 per cent income tax and to personal taxes in the various States ranging from 1¼ to 2 per cent.

Under the new plan adopted by the Treasury Department the first "Liberty" loan of $2,000,000,000, paying 3½ per cent, will be retired and replaced by 4 per cent bonds subject to income supertaxes. In the hands of persons having moderate incomes the new bonds will be free of tax and this fact will no doubt materially assist in giving them a wide distribution, although it will make them less attractive to large investors and financial institutions. The second "Liberty" loan will be launched about October 1, but it is said that its flotation will be accompanied by less spectacular features than marked the first bond sale.

The radical element in the Senate led by LaFollette, of Wisconsin, Johnson, of California, and Norris, of Nebraska, has developed such strength that the Finance Committee has been completely stampeded and has been forced to abandon certain important features of its excess profits tax plan in favor of higher rates and more drastic requirements. It is true the Senate rejected Senator LaFollette's proposition for a maximum tax of 80 per cent, but on the other hand Chairman Simmons has been forced to bring in a comprehensive amendment fixing a maximum of 60 per cent, accompanied by an entirely new provision designed to tax a great many corporations with large earnings which would pay no excess profits taxes under the original Senate bill.

How Railroad Spikes Are Made

Track spikes, according to Charles E. Slyke, superintendent bolt and rivet department, Inland Steel Company, in one of that company's safety bulletins, are made from basic open-hearth steel containing from 0.15 to 0.24 per cent carbon; 0.45 to 0.50 per cent manganese; 0.05 per cent phosphorus and 0.06 per cent sulphur, which resists the weather better than Bessemer steel, and containing less phosphorus is less liable to crystalization.

Spikes, he explains, are made from square bars, cut in 23½-ft. lengths, the rough size being 1/64 in. larger than the shank diameter of the finished spike to meet the reduction in forging. These bars, though heated to a higher temperature than rivet and track bolt bars, are charged into similar continuous heating furnaces. As the bars are heated they are pushed through the furnace by the charger to the feeder, who grasps them with a pair of tongs and feeds them into the rolls of the automatic machine which shears, points and heads the spike. The spike is then dropped upon an endless conveyor and carried to the cooling bins.

The essential features of a good spike as outlined by Mr. Slyke are: A short, square point; freedom of fins, especially large ones; full, well-formed heads concentric with the shank of the spike, and the proper angle under the heads to conform to the number of degrees outlined in the specifications and blue prints so that the spike will fit the flange of the rail. The spikes must also be true to size.

Planning Department in Modern Shops*

Duties of the Four Different Managerial and the Four Production Heads and the Qualifications Essential

BY COOPER

The original planning department as developed by Dr. Frederick Winslow Taylor is composed of eight main functions, with the work equally divided between the shop and the management. The four managerial functions are

1. Routing
2. Instruction
3. Time and cost records; and
4. Discipline;

while the shop or productive division supports

1. The gang boss
2. The machine speed boss
3. The repair boss; and
4. The inspector.

Routing

The function of routing embraces (1) the production clerk; (2) the route clerk; (3) the order-of-work clerk, and (4) the recording clerk. The routing function or division determines the "when," the "who" and "where" and the "sequence" of the work.

Production Clerk.—The production clerk determines the "when" of an order in point of time. It is his duty to act as the mediary between the production division and the sales division. He is the "program maker" in that he determines the relative importance of the various jobs on hand, and decides the order in which the various orders shall be finished. From the production clerk the sales department receives its promises of delivery, and from him the order-of-work clerk receives his general order of work; more properly, perhaps, the sequence of orders. The production clerk is usually the head of the planning department, and his function is almost entirely one of control.

Route Clerk.—The route clerk determines the "where" of the work in the shop. It is the route clerk who analyzes the work, prepares the route charts, the route sheets, the operation tickets, inspection tickets, bulletin-board cards, tool lists, etc. It is the route clerk who determines where in the shop—at what machine or workplace—the work shall be done. It is the route clerk who has at hand the capacities of all the various equipment and their operating rates, and who is, therefore, best able to lay out the routing of the work in such a manner that it may be done in the most economical way possible. The route clerk's function is very largely one of preparation.

Order-of-work Clerk.—The order-of-work clerk is responsible for maintaining the schedule supplied him by the production clerk. He is the "train dispatcher" of the organization. It is his duty to keep some sort of a record of the work ahead of each employee and see to it that no employee gets out of a job. It is the order-of-work clerk who determines the sequence of the work and who shall do it. The bulletin-board shows him the work in process on the machines and the work ahead of each machine, and with his records of work ahead of each employee, he has the pulse of the shop constantly between his fingers. The order-of-work clerk's function is clearly one of control.

Recording Clerk.—The recording clerk, as his title implies, keeps track of the record of the progress of the work in process. Provided with route sheets and progress charts, he keeps a running record of the progress of work on individual parts and on the complete orders. It is the recording clerk who usually issues and receives the operation tickets, inspection tickets, move tickets, store issues, etc. It would seem almost obvious that the function of the recording clerk is that of records, but inasmuch as these records are more especially for the purpose of controlling the work than they are permanent records of performance, it must be conceded that his function is more properly relegated to control.

Instruction

Constituting the function of instruction, we find (1) the instruction-card man; (2) the time and motion-study man, and (3) the development man.

Instruction-card Man.—It is the instruction-card man that determines the "how." He is the superintendent of method. It is he who studies all the possible methods of performing an operation, analyzes them and finally determines the standard. It is he who has at hand a complete inventory of tools, jigs and fixtures, and prepares the tool lists. His function is purely one of teaching; it is his job to supply the workman with written detailed instructions, tool lists, photographs, models, etc., and to lend him whatever assistance he can to enable him to perform the work in the quickest and best way possible with the minimum of waste of energy, time and materials. His function is clearly one which belongs under the head of preparation.

Time and Motion-Study Man.—The time-study man, the motion-study man, or the rate setter is first of all the analyst of method. It is he who makes a careful study, a detailed analysis of the different operations, records the time required for each, and, by synthesizing the best units, sets the standard of performance. The investigations of this function put it clearly under records.

It may be well noted at this point that a difference exists between time study and rate setting as commonly practised, and motion study in its true significance. Time study is especially concerned with an analysis of the operation from the point of view of the time required. Rate setting is nearly synonymous with time study and is the process of making up the task from the time-study analysis and setting the rate for the work. Motion study, as its name suggests, is primarily an analysis of the operation from the point of view of the motions required to perform the operation, the muscles required to execute those motions, and the nervous energy necessary to operate those muscles. The time element in motion study, while obviously important, is more or less incidental. Motion study is a thoroughly scientific investigation of methods; the act of timing them is the measurement of result. It must be conceded, too, that the motion-study analysis is far more dependable and accurate than the time-study analysis, and as a means of standardizing methods is a very important aid to the function of instruction.

The Development Man.—There might arise some question as to the logic of placing the division of development—the development engineer—under the instruction-card function, but be it remembered that every development affects, to a greater or lesser extent, the method of operation. Development, be it in machine design, tool design, buildings, motive power, or routine, affects the "how" of the operation, and it would seem that it might well be classified as a sub-function of the instruction division as a factor in preparation.

Time and Cost

The time and cost function can only be classed as record. It comprises the timekeeper, the cost clerk and the record clerk or statistician.

The Timekeeper.—The function of the timekeeper is plain. It is his duty to receive the time of all workmen. Receiving this time from the operation tickets of the workmen, he is able, simply by assorting the tickets by

*From an address before the Providence Engineering Society.

(*Continued on page* 584)

Some Unusual Structures of Wrought Iron*

Non-Homogeneous Distribution of Phosphorus the Cause of Failures in Service—Behavior When Annealed

BY HENRY S. RAWDON*

THE structure of wrought iron as usually described is that of a fairly pure iron. Impurities, if present, are usually considered as being in solid solution in the crystals of the ferrite matrix or as forming part of the ever-present "slag streaks." One type of these dissolved impurities is here discussed. Attention is called to the detection of such impurities, particularly in low-grade irons, and to their possible influence on the physical properties of the metal.

The attention of the Bureau of Standards was first directed to wrought iron of the peculiar and unusual characteristics described later, in material which had failed in service and was submitted for test. The examination was extended to other grades of wrought iron, to see whether such features are of common occurrence in this class of material.

The structure of a sample of Swedish iron illustrates well the matrix of ferrite crystals in which are embedded the slag threads so characteristic of the puddling process and the subsequent working of the material. The usual commercial product contains varying amounts of the impurities commonly associated with iron and steel, such as manganese, phosphorus, silicon and sulphur together with small amounts of carbon. Of these, the larger part of the phosphorus and some of the silicon present are held in solid solution in the ferrite while most of the remaining impurities, other than carbon, exist in the inclosures of slag. Aside from the discontinuities introduced by the slag streaks the ferrite matrix has the microstructure and appearance of a pure metal. No definite orientation of the various crystals or grains is apparent; deep etching of the specimens reveals no intracrystalline features (within the grains) other than those noted in pure metals in general (etching pits).

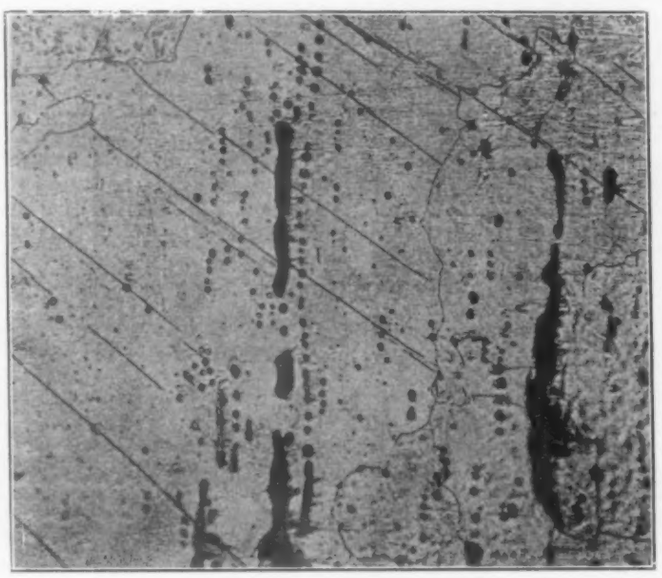


Fig. 1—The Dark Lines, Parallel Within Any Single Grain, Are the Neumann Lines. The mottled appearance of the corner grains indicates the non-homogeneity of the ferrite due to the unequal distribution of the phosphorus. Specimen: W1, longitudinal section. Etching, 10 per cent alcoholic nitric acid

The unusual features may be best illustrated by a description of the structure of the specimen in which they were first observed in abundance. This piece was a wrought iron eye-bar, a tension member of a railway bridge which after about 30 years' service was modified to suit the increased traffic. After this modification the member referred to above failed. The microscopic examination of the metal revealed, in addition to the usual structure of wrought iron, several structural features so striking as to mark the sample at once as a wrought iron of very unusual properties and composition.

The ferrite crystals presented a peculiar mottled appearance, particularly after prolonged etching with an acid reagent. This etch pattern was not found over the entire surface of the specimen but was restricted to certain streaks throughout the metal. Particularly was it found associated with crystals unusually large in size (Fig. 3).

The etch pattern referred to is illustrated in Figs. 1, 2 and 3. By using the copper chloride etching reagent, referred to later, these patterns may be developed in a very striking manner. They sometimes consist of broad parallel bands, as seen in cross-section, extending across the elongated crystals (Fig. 2) and bearing some resemblance to twinned crystals. More often they present an indefinite mottled appearance of light and dark areas very similar to the shadows cast by the sunlight streaming through between the leaves of a tree (Figs. 1 and 3). The crystals of ordinary wrought iron will not exhibit such etch patterns even after very prolonged etching.

The examination of the metal close up to the fracture, which occurred during the service of the material, shows that the break occurred through the crystals and parallel to the markings constituting the mottled etch-pattern at that point (Fig. 6). Many of the crystals close to the face of the fracture show another variety of intracrystalline markings. On casual examination these may be mistaken for scratches left by poor polishing of the material (Fig. 1). Closer inspection, however, shows that these markings are parallel to one another within any one crystal and terminate very abruptly at the crystal boundaries. If a slag enclosure lies in the course of one of these markings, the line ends abruptly, reappearing on the other side of the "slag" thus indicating clearly that it is not a scratch.

The obvious conclusion is that the non-homogeneity of the individual crystals as indicated by the mottled etch-pattern is to be attributed to some impurity dissolved in the iron but not uniformly diffused throughout the crystal. Robin has called attention to the fact that in ferrite containing considerable phosphorus, 1 per cent, such a non-homogeneity may exist.

The Materials Examined

The variations from the usual microstructure of wrought iron, first noted in the wrought-iron bridge member which failed in service, appeared so striking and unusual in character and have been so meagerly described in the literature on the subject that the examination was continued to other grades of iron. From the accumulated series of wrought-iron specimens which have been submitted to the Bureau of Standards from time to time for examination, some 35 samples were chosen for detailed microscopic examination. Much of this material had been submitted as unsatisfactory and one of the purposes of the examination was to see

*From a paper to be presented at the St. Louis meeting of the American Institute of Mining Engineers in October, 1917. The author is associate physicist (metallography), U. S. Bureau of Standards.

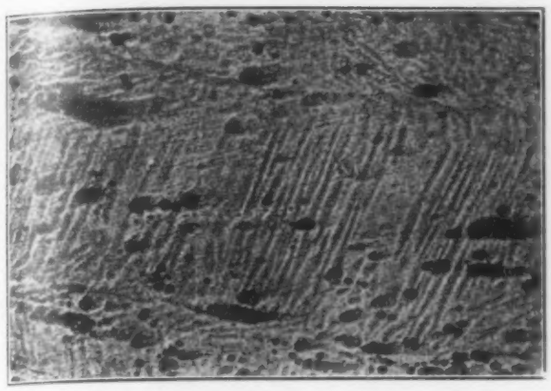


Fig. 2—Specimen Showing the Mottled Etch-Pattern Occurring as Parallel Transverse Bands Within the Grains. Etching, 10 per cent nitric acid in alcohol. × 100

Fig. 3—The Streaks Exhibiting the Unusual Etch Pattern Are Very Often Composed of Grains That Are Much Larger Than the Average for the Piece. Etching, 10 per cent nitric acid. Same material as Fig. 2. × 100

whether such material is characterized by microstructural features similar to those noted above.

The examination was made by means of Stead's method of etching, making use of an alcoholic cupric-chloride solution acidulated with hydrochloric acid, by which the segregation of phosphorus is shown by the differential precipitation of copper on the surface of the metal. The precipitation of copper on the areas relatively low in phosphorus is much heavier than on the portions of higher phosphorus content, so that the approximate distribution of this element is rendered visible to microscopic examination.

The results of the examination indicate that the unusual microstructure noted in the failed eye-bar, while not to be regarded as a common feature of wrought iron or always associated with iron of inferior grade, is not unique for the single specimen in which it was first observed. It was noted, however, that such features were found only in material, or portions of material, that according to Stead are to be regarded as relatively high in phosphorus.

The comparison of the structure of the iron-phosphorus alloys (from a series specially prepared by the Bureau and described in the paper) with that observed in the wrought irons examined is instructive and very suggestive as to the nature of the markings there seen. The brown or dark bands and spots forming the mottled etch-patterns are the portions of the ferrite rich in phosphorus and each individual crystal in the streaks of the metal showing such mottled appearance is to be regarded not as a simple entity but as a rather complex aggregate. That the different portions of a single ferrite crystal in such portions vary considerably in their properties is to be inferred from the marked variation in composition.

The analyses for phosphorus of many of the materials listed show that, though such unusual features of structure as have been described are invariably associated with irons which are rather high in phosphorus, one cannot predict with certainty their presence from a knowledge of the average phosphorus content alone. Some of the samples, though comparable in respect to the phosphorus content, showed no traces of these unusual features.

Upon continued polishing of the specimens before etching, a faint trace of the markings may be seen and recognized by one after becoming familiar with this type of iron. By acid etching, preferably using a 5 or even a 10 per cent alcoholic solution of nitric acid, the etch pattern may be satisfactorily developed. The specimen shows to the eye the brown and purple oxide tints similar to those which are often observed when hardened and tempered steels are etched with an acid reagent. By using the cupric chloride solution described by Stead the heterogeneous structure may be developed much more strikingly than with acid alone. Though the amount of copper precipitated is very slight, the decided increase of contrast in the etched specimen when the acid copper-chloride reagent is used over that obtained with acid alone warrants the conclusion that it is to the copper that the more rapid etching action and the striking contrast produced is to be largely attributed. The areas constituting the mottled etch-pattern which are darkened are those relatively high in phosphorus, as is plainly indicated in Fig. 4.

Behavior upon Heating

The persistence of the unusual intracrystalline structural features upon heating is remarkable. Fig. 5 (left) shows the appearance of a specimen of the wrought-iron eye-bar previously described after heating for 3 hr. at approximately 600 deg. C. (585-625 deg.) and then allowed to cool in the furnace. No appreciable changes have resulted by this treatment. A second sample (Fig. 6, right), heated for about 1½ hr. at approximately 725 deg. C. (718-735 deg.) and furnace-cooled, still shows faint traces remaining of the former condition. The eutectic disappeared by solution of the compound, Fe_3P, in the ferrite but the non-homogeneity of structure as shown by the dendritic pattern still persists. This illustrates well the remarkably slow rate of diffusion within the ferrite matrix by which

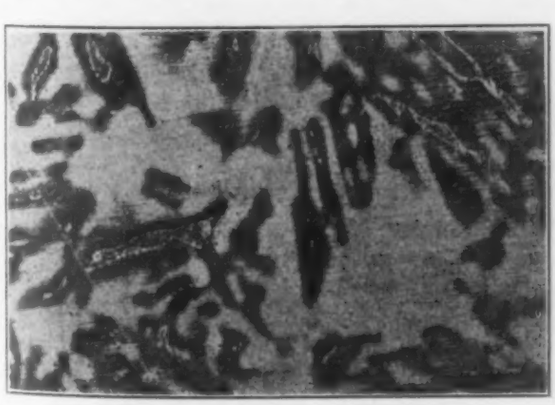


Fig. 4—The Dark Areas Are Portions of the Ferrite High in Phosphorus and Shows Some of the Eutectic as Islands in the Midst of the Dark Areas. × 100. Etching, alcoholic copper chloride with hydrochloric acid

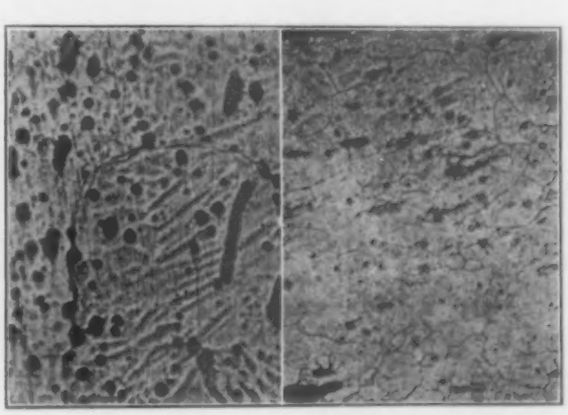


Fig. 5 (Left)—Effect of Annealing. Material of Fig. 2 heated for 3 hr. at 600 deg. C. Etching, 10 per cent nitric acid. × 100. Fig. 6 (Right)—Same material as Fig. 5, heated for 1½ hr. at 725 deg. C. Etching, 10 per cent nitric acid. × 100

equilibrium is finally attained. The presence of the compound Fe_3P which had separated out from the matrix most probably accounts for the much slower rate of diffusion in this latter case than was observed in the case of the first wrought-iron samples that were annealed.

The slow rate of diffusion of phosphorus in ferrite has often been remarked and it is undoubtedly due to this cause that the mottled structure persists and is not wiped out during the manufacture of the wrought iron, that is, during the heating, rolling and forging necessary before the wrought iron reaches the finished condition.

Significance of the Unusual Features

The significance of these unusual features of microstructure and their possible relation to the service behavior of such material may be suggested. The occurrence of material of this type in two of the samples examined, both of which failed in service and which have the appearance of having failed under the action of alternations or repetitions of stress suggests a possible relation between this type of structure and the failure of such material.

The method by which fatigue breaks occur in metals by the action of repeated stresses has been clearly and conclusively set forth by metallurgists. The minute back-and-forth slip along certain planes occurring within the crystals if repeated a sufficient number of times becomes a permanent displacement, thus initiating

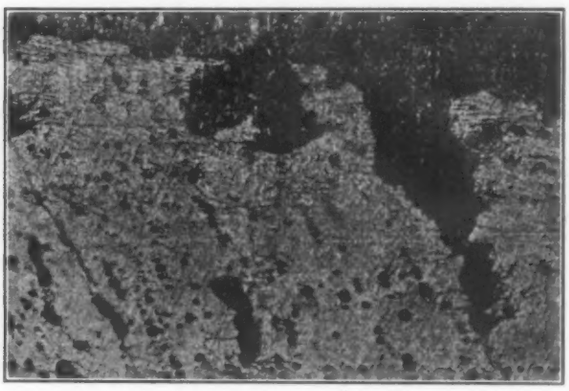


Fig. 7—Relation of Structural Features to the Service Behavior of the Material. Longitudinal section of wrought iron which failed in service. The edge of the fracture is parallel to the bands which constitute the etch-pattern here. Etching, 10 per cent nitric acid. × 100

an incipient fracture within the crystal. The combined effect of this action within a number of neighboring crystals at some portion of the specimen will be sufficient to cause a real fracture to start at that point if the application of the stresses is continued.

The brittle character of ferrite containing considerable phosphorus is well known. Crystals which show the heterogeneity caused by high and low-phosphorus bands in juxtaposition should be much more easily fatigued by repeated stresses and show a permanent slip much more quickly than crystals which are more uniform throughout in their structure. In particular, this should be true if the bands are transverse to the direction of the stresses acting. The observations upon the fracture of the broken eye-bar appear to confirm this.

The fact that the face of the fracture followed and its course apparently was determined by the bands within the ferrite crystals has already been referred to. Fig. 7 shows that the break occurred parallel to the bands of high-phosphorus ferrite which give rise to the peculiar etch-pattern. Examination of the metal immediately back of the face of the fracture reveals further evidence.

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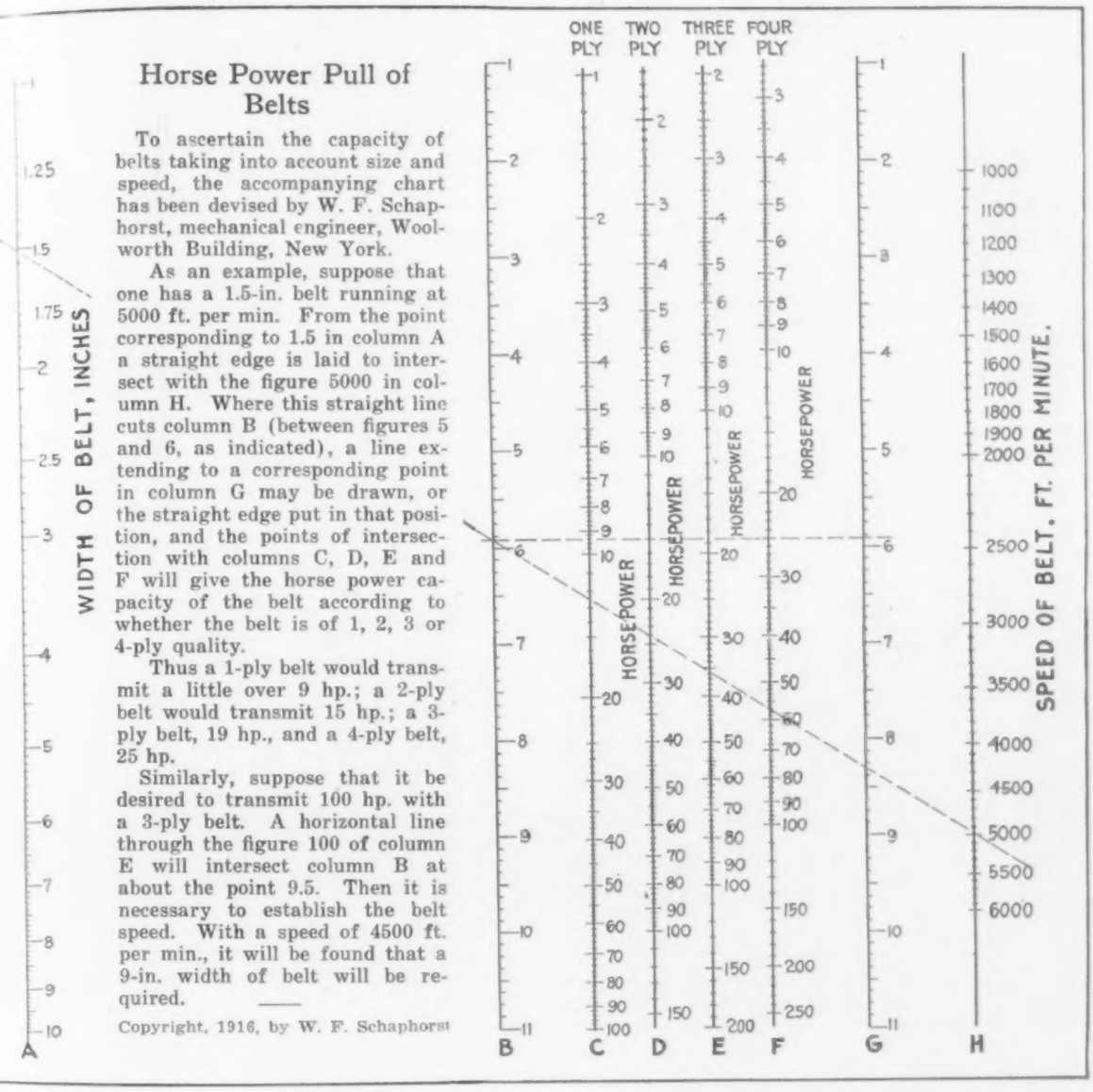
Thus a 1-ply belt would transmit a little over 9 hp.; a 2-ply belt would transmit 15 hp.; a 3-ply belt, 19 hp., and a 4-ply belt, 25 hp.

Similarly, suppose that it be desired to transmit 100 hp. with a 3-ply belt. A horizontal line through the figure 100 of column E will intersect column B at about the point 9.5. Then it is necessary to establish the belt speed. With a speed of 4500 ft. per min., it will be found that a 9-in. width of belt will be required.



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equilibrium is finally attained. The presence of the compound Fe_3P which had separated out from the matrix most probably accounts for the much slower rate of diffusion in this latter case than was observed in the case of the first wrought-iron samples that were annealed.

The slow rate of diffusion of phosphorus in ferrite has often been remarked and it is undoubtedly due to this cause that the mottled structure persists and is not wiped out during the manufacture of the wrought iron, that is, during the heating, rolling and forging necessary before the wrought iron reaches the finished condition.

Significance of the Unusual Features

The significance of these unusual features of microstructure and their possible relation to the service behavior of such material may be suggested. The occurrence of material of this type in two of the samples examined, both of which failed in service and which have the appearance of having failed under the action of alternations or repetitions of stress suggests a possible relation between this type of structure and the failure of such material.

The method by which fatigue breaks occur in metals by the action of repeated stresses has been clearly and conclusively set forth by metallurgists. The minute back-and-forth slip along certain planes occurring within the crystals if repeated a sufficient number of times becomes a permanent displacement, thus initiating

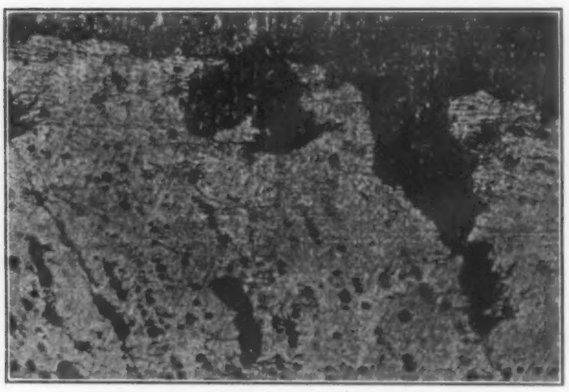

Fig. 7—Relation of Structural Features to the Service Behavior of the Material. Longitudinal section of wrought iron which failed in service. The edge of the fracture is parallel to the bands which constitute the etch-pattern here. Etching, 10 per cent nitric acid. × 100

an incipient fracture within the crystal. The combined effect of this action within a number of neighboring crystals at some portion of the specimen will be sufficient to cause a real fracture to start at that point if the application of the stresses is continued.

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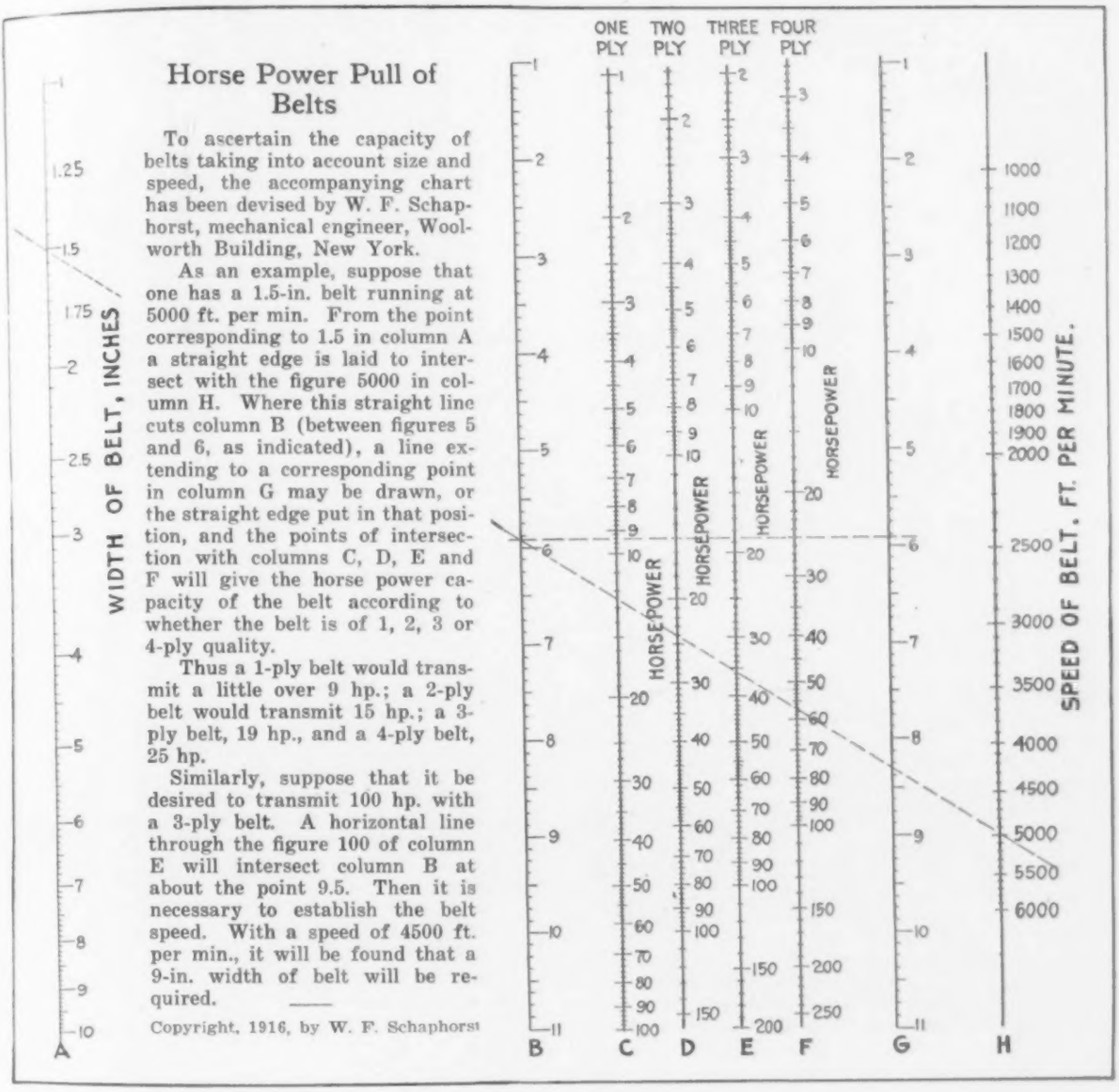

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Turbo Units versus Gas Engines

Comparative Data on Cost of Installation and Operation—Influence of Turbo Blowers on Blast-Furnace Operation

IN a paper presented some months ago before the Engineers' Society of Western Pennsylvania, Richard H. Rice, engineer, General Electric Co., and Sanford A. Moss, engineer turbine research department of that company, sought to show that turbo units for generating electric power and blowing the blast furnace are more economical than gas-engine units when total operating costs, including fixed charges, are considered. To this end they compared estimates of total first costs and total operating costs of two steel-mill plants each having four 550-ton blast furnaces; one plant using turbo blowers and generators and the other using gas engines as prime movers. Cost data on which these estimates were based, they explained, were obtained from operating plants and were adjusted to prices ruling November, 1916.

The discussion which followed the presentation of this paper appeared to indicate an interest in the comparison of power-generating costs segregated from those applicable to the blowing room. At a meeting of the American Iron and Steel Institute in New York, May 25, Mr. Rice, discussing "Recent Installations of Large Turbo Generators," reviewed the points emphasized in the paper before the Engineers' Society of Western Pennsylvania, gave substantially all the data contained in it, and also compared segregated power-generating costs as estimated for each of the two plants. As the second paper supplements the first, the two have been combined in the following review.

Both power plants are taken of sufficient size to supply the blast furnace demands for water, air, steam and electricity, and in addition 5000 kw. per furnace and 4450 gal. of water per min. per furnace for steel mills. The turbo-generator station is provided with three 12,000-kw. units, one as a spare, and is considered as operating on 235 lb. per sq. in. steam pressure with 200 deg. superheat and 28.5 in. vacuum. An instance of a plant operating on 150 lb. pressure and 28 in. vacuum also is cited as giving favorable results. The coke consumption in the blast furnaces is considered as 1800 lb. per ton of iron produced.

Proper Fixed Charges

A striking fact brought out by the comparison covers the cost of installation. In the past additions to operating costs have not been made for charges on the capital invested in new installations of prime movers, but it is important that this be done to arrive at proper fixed charges. The latest types of steam turbines permit a steam plant to operate with the same output of electric power to the mill, as plants containing gas engines, by the use of a reasonable amount of make-up coal, while leaving sufficient gas for blowing purposes. Therefore, the cost of fuel is one of the smaller considerations in judging the merits of the two types of installations and proper comparison should be based on the addition of fixed charges and running charges to the cost of the excess coal used in the turbine plant.

For gas-engine plants fixed charges are properly taken as 13 per cent and for turbo electric stations as 11 per cent. In the comparison to avoid discrimination which would appear favorable to the turbine plant, the figure 13 per cent is used throughout, subdivided as follows:

Subdivision of Fixed Charges of Power Plants

Interest (on bonds or capital invested)	5 per cent
Taxes	1 per cent
Insurance	1 per cent
Obsolescence	6 per cent

Running charges include operating charges and also charges for maintenance and repairs. The cost of coal is $2 per long ton delivered at the fireroom door, of 13,500 B.t.u. per lb. calorific value.

The tabulation of costs on page 543 indicates that the gas engine plant will cost to install nearly $4,500,000 in excess of the steam turbine plant, or 260 per cent of the turbine plant. The operating costs of the gas plant will be $550,500 per year, or $2.95 per ton of pig iron more than that of the turbine plant, or a ratio of operating costs of 1.91 to 1.

Heat balances of the furnace gas during average week day working hours are as follows:

Gas Engine Plant

	Million B.t.u. Per Hour	Per Cent
Boilers	62	5.8
Electric station	*380*	*35.3*
Blowing station	*88*	*8.2*
Stoves	323	30.0
Margin	223	20.7
	1,076	100.0

Turbine Plant

	Million B.t.u. Per Hour	Per Cent
Pumps and miscellaneous	81	7.5
Turbo generators	*420*	*39.0*
Turbo blowers	*148*	*13.8*
Stoves	323	30.0
Margin	223	20.7
	1,195	111.0
Deduct heat from coal	119	11.0
Heat from gas	1,076	100.0

The heat balance for the turbine plant is proportionate to the steam consumption, allowing 70 per cent boiler efficiency, and is nearly, but not exactly, comparable with the gas plant, the internal gas washing, electric and steam distribution being different.

Electric Station Costs

To show that all the saving in total charges is not realized in the electric station, the following table was prepared showing the first cost and charges of the electric station by itself.

Segregated Electric Stations
First Cost:

	Gas Engine	Steam Turbine
Primary washers	$46,400	$46,400
Secondary washing station	244,000	.....
Gas pipe from boiler house	172,000	.....
Boilers and piping	128,440	483,900
Boiler house	33,500	85,000
Electric station apparatus	*3,250,000*	*745,600*
Electric station house	*250,000*	*69,200*
Pumping station, standpipe, conduits	180,000	127,750
	$4,304,340	$1,557,850

Charges—Dollars Per Year
Running Charges

	Gas Engine	Steam Turbine
Primary gas washers	$740	$740
Secondary gas washers	34,150	.....
Boilers	9,750	36,200
Electric station	*90,000*	*68,250*
Pumping station	1,400	1,830
Running charges, total	$136,040	$107,020
Fixed charges at 13 per cent	560,000	202,000
Total charges	$696,040	$309,020

Thermal Efficiencies of a Complete Station

	Per Cent
Best gas engine, as used in this paper	17.40
Good gas engine	16.25
Turbo-generator plant of paper	17.75
Largest turbo-generator plant	20.80

With variable loads the thermal efficiency of the turbine plant will hold up closely to these figures, and that of the gas engine plant will fall off considerably.

Flexibility of Turbo-Blower

Experience with centrifugal compressors on blast furnaces demonstrates that variations in blast are undesirable, and that the use of centrifugal compressors results in an improved output, less dust and a general steadying up of conditions. A part of this improvement is due to the steadiness of the blast and a part is due to the more accurate control of the rate of

blowing made possible by a constant volume governor in the intake which corrects the blast for changes in barometer and atmospheric humidity and temperature. Also turbo blowers are manufactured in such sizes that a single blower may be used to a furnace, allowing correct adjustment to exact furnace conditions.

Discussion

The following summaries are of discussions which followed the presentation of these papers. Those by Dr. D. S. Jacobus and Alex Dow were given before the American Iron and Steel Institute; the others before the Engineers' Society of Western Pennsylvania.

Alex. L. Hoerr, chief engineer, National Works, National Tube Co., McKeesport, Pa., questioned some of the statements made regarding the advantage in an operating sense, of the turbo blower over the reciprocating engine. In an engine driven plant the pulsations are almost eliminated by the large volume of the blast lines and stoves. At one plant where a furnace was blown alternately by engines and blowers, it was found that the amount of dust made did not depend on the type of blowing machinery used, but was up and down with both types, apparently governed by other than blast variations.

Frederic Ottesen, chief engineer, gas engine department, Mesta Machine Co., Pittsburgh, called attention to previous papers presented before the American Iron and Steel Institute by H. J. Freyn and Arthur West. Mr. Freyn, he said, stated that coal of 10,500 B.t.u. per lb. would have to cost only 42 cents per gross ton at Gary to reduce to nothing the saving due to the installation of gas engines, and make the steam-turbine installation commercially equivalent to the existing gas-engine installation. Mr. West stated that previous to the installation of gas engines at the Lehigh plant of the Bethlehem Steel Co. the coal bill was more than $1,000,000 a year, while after the installation of gas engines this bill was entirely wiped out.

Mr. Freyn places the gas engine installation cost as 50 per cent more than the steam turbine installation, whereas the authors place this cost at 260 per cent of the steam-turbine plant. The authors have chosen the most expensive way of selecting the gas-blowing units and one which does not conform with present-day practice. Also the efficiency of the turbo blower will fall with a change of pressure, and the pulsations due to reciprocating engine blowers is likely to benefit rather than impair the blast furnace operation, especially regarding hanging.

When modern installations are made two single tandem gas blowing engines are used for blowing a 500-ton furnace and one single tandem engine as spare for every two furnaces. The four-furnace plant would, on this basis, be equipped with ten single tandem gas blowers instead of eight twins. In other words, there would be only 16 gas cylinders and eight air cylinders in operation under normal conditions, as against 24 gas cylinders and 12 air cylinders in the case which Mr. Rice refers to.

It is now possible, and the time will come soon, when there will be on the market 5000-kw. blast-furnace gas engines instead of 2500 to 3000 kw., as is now the case. This will simplify and cheapen the installation materially, and make gas power still more desirable.

A. N. Diehl, assistant general superintendent, Duquesne Works, Carnegie Steel Co., said that his company had installed a 15,000-kw. turbo generator and boilers to develop steam at 250 lb. pressure and 150 deg. superheat in preference to gas engines for generating power, and believes that taking into consideration first cost of equipment and cost of operation, the company was justified in doing so.

P. M. Lincoln, commercial engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, differentiated between the present-day large units for generating power and the former small units. As long as the steam turbine units required were under 3000 hp. the gas engine may have had a place, but now that single units run to 60,000 and even 70,000 kw. with economy as low as 10 and 10½ lb. of steam per kw.-hr., the gas engine cannot compete.

B. R. Shover, consulting electrical engineer, Pittsburgh, who was formerly general manager of the Tata Iron & Steel Co., Sakchi, India, which plant, he said, has only turbo blowers and turbo generators, answered a question as to the unfairness of including a machine shop with the cost of the gas-engine station and not including one with the turbo station. Experience would tend to show that a machine shop was a necessary part of the equipment of a large gas engine station, while after five years continuous service at Sakchi the only repair on either blower or generator outfits was the changing of a set of diffusion vanes on one of the blowers.

Only about five-eighths of the pig iron produced at that plant was converted into steel, but there was ample steam raised from surplus gas, with the use of coal only as pilot fires, to operate the entire works. Not a single white man is regularly employed in operating the station and, in fact, none of the Indians there ever even saw similar apparatus previous to employment at that works.

Bryant Bannister, engineer, National Tube Co., Pittsburgh, stated that he has made a complete comparison of costs of turbo and gas-engine blowers for blast furnace service, including fixed charges, operating costs,

Comparative Costs for Typical Four-Furnace Plants

First Costs:

	Gas Engine	*Steam Turbine*
Primary washers	$131,250	$131,250
Secondary washing station	300,000	.....
Gas pipe from boiler house	212,500	.....
Boiler and piping	167,500	609,200
Boiler house	41,250	123,750
Electric station apparatus	*3,250,000*	*745,600*
Electric station house	*250,000*	*69,200*
Blowers, etc.	*1,812,500*	*726,416*
Blowing station house	*237,500*	*69,200*
Pumping station, standpipe, conduits	787,500	293,484
	$7,190,000	$2,768,100

Charges—Dollars Per Year:

Running Charges	*Gas Engine*	*Steam Turbine*
Primary gas washers	$2,100	$2,100
Secondary gas washers	42,000	.....
Boilers	12,000	52,750
Electric station	*90,000*	*68,250*
Blowing station	*49,500*	*42,000*
Pumping station	6,000	4,000
Running charges, total	$201,600	$169,100
Fixed charges at 13 per cent	934,500	359,800
Coal	21,652	78,352
Total charges	$1,157,752	$607,252

etc., and that this comparison showed that the only item favoring the gas-engine blowers was that of fuel economy. When fixed charges were considered the turbo blowers were considerably ahead in ultimate economy. He cited a plant using turbo blowers which during a period of 3½ years was not forced to make use of its spare on short notice, and also a turbo blower which had been in operation 6 months without shutdown.

Prof. Willibald Trinks, professor, mechanical engineering, Carnegie Institute of Technology, Pittsburgh, suggested that a plant with turbo generators for power development and gas-engine blowers would be the most economical. The steam turbine is more economical than the gas engine for producing power where coal is moderately priced, but the gas-engine blower shows better economy than the turbo-blower. Also, the correction by the automatic governor is not automatic. Some person must measure the temperature, the pressure and the moisture, and the latter is not a very simple process. After making these measurements the number of revolutions which the blower engines should maintain may be determined by slide-rule calculation.

Dr. D. S. Jacobus, advisory engineer, Babcock & Wilcox Co., stated that by using the most modern equipment of boilers, superheaters and economizers, with gas which is passed through primary washers, a boiler efficiency of 81 per cent can be obtained with the best sort of operation for a continuous load.

To obtain the best efficiencies with blast-furnace gas there must be a sufficient furnace volume so disposed that there will be a proper path of travel for the

(*Continued on page* 583)

RUSH BUILDING DESTROYERS

President Wilson Approves Plan Proposed by Secretary Daniels

WASHINGTON, Sept. 4.—President Wilson has given his formal approval to a comprehensive and altogether novel program of naval construction involving the expenditure of $350,000,000 in the building of 160 torpedo boat destroyers. The estimates have been forwarded to Congress and the entire influence of the Administration will be exerted to secure the necessary appropriation at the earliest possible moment, certainly before the adjournment of the present special session. Both the President and the Secretary of the Navy appreciate the fact that to carry out this plan of destroyer construction will interfere more or less with the work of the United States Shipping Board in hastening the building of the giant fleet of cargo vessels, but the superior efficiency of the torpedo boat destroyer in campaigning against the submarine is regarded as justifying any slowing down that may result to the plans of the Emergency Fleet Corporation.

The plans of the Navy Department to obtain a large additional fleet of destroyers have been worked up along lines similar to those adopted by the Shipping Board at the instance of General Goethals. The managers of the leading shipyards of the country, in which the destroyers authorized by the last naval appropriation act and those subsequently ordered under the President's emergency fund are being built, have declared very positively that it is impossible to build any more destroyers with existing facilities. They have added, however, that if the Government will supply the money and guarantee deliveries of the necessary materials, especially structural steel and ship plates, the proposed fleet can be constructed and delivered in its entirety within 18 months. To accomplish this, however, it is probable that three distinct classes of establishments will have to be created or commandeered and devoted exclusively to the work. It will be necessary, in the first place, to condemn considerable tracts of land in the vicinity of five or six of the largest shipbuilding plants and to provide a large number of shipways designed especially for the building of destroyers. The majority of these new yards or extensions will be located on the Atlantic coast.

Fabricating Plants

The second step will probably be the establishment of one or more fabricating plants for the fitting of shapes and plates for the destroyers. It is probable that the entire 160 vessels will be built on not to exceed three sets of plans and this standardization will facilitate the use of material fabricated on a comparatively large scale; thus, as in the case of the building of cargo ships for the Emergency Fleet Corporation, the work in the yards at tidewater will be chiefly that of assembling, and therefore the amount of labor necessarily employed will be reduced to a minimum.

The third step in preparing for the building of the destroyers will be the construction or commandeering of several large plants in which will be built the power units, which will be standardized as closely as practicable. It is understood that all the engines are to be oil-burning, and while well-known types will be built, the demand for 160 sets, in addition to those now being constructed for destroyers and other warships heretofore ordered cannot be met without providing extensive new facilities from the ground up. Experts of the department have surveyed several automobile plants having capacity for a large output of small gas engines. While such facilities with certain modifications can be employed in building motors for airplanes, very comprehensive changes will be necessary to fit them up to build oil-engines for destroyers. The engine problem is a serious one and will probably be solved by placing a large number of orders for small numbers of oil-engines in individual plants throughout the country and having the remainder of the power units built in specially constructed plants.

At Interior Points

With the exception of the yards where the destroyers will be assembled and launched, it is the purpoes of the Navy Department to locate all the building facilities at interior points. This is not with a view to protecting the plants from attack (as has been suggested, but rather for the purpose of utilizing the labor of which the department is informed there is a larger supply now available in the vicinity of inland manufacturing centers than on the coast. If one or more fabricating plants are utilized in fitting up shapes and plates for the destroyers, they will be located with reference to the steel works from which these materials will be procured.

The financing of this big project will mark an innovation in Government work. As in the case of the fabricated steel cargo ships to be built for the Emergency Fleet Corporation, the destroyers will be constructed on a cost-plus-profit basis. The Government will provide the steel, which it will purchase in accordance with the terms of the President's ruling with respect to prices. The yard extensions will be obtained on leases where practicable, but in case condemnation is necessary the Government will take title and will subsequently dispose of the land in such manner as may seem advantageous when the war needs have been met. The fabricating plants will probably be constructed by the Government and it may also be necessary to build special plants for the manufacture of the power units and other equipment. If possible, however, arrangements will be made with engine building concerns to enlarge their works, the Government furnishing the funds or providing in the contracts for adequate amortization.

Vital Military Necessity

Concerning the new destroyer program and the method of its execution the Navy Department has made a brief official statement in part as follows:

The General Board of the Navy, the Chief of Operations of the Navy, and a special board on the submarine menace, recently ordered to consider and report upon the whole subject, are agreed in believing that, at present, the construction of a maximum number of destroyers is the most desirable material development for the Navy and a vital military necessity, and have so reported to Secretary Daniels.

Arrangements have already been made to accelerate to the utmost extent practicable the construction of all destroyers under contract at the beginning of the war and ordered since. The large orders for additional destroyers under the naval emergency fund in the last naval bill and the pending deficiency in this fund absorb all the present facilities for destroyer construction in the country which give promise of prompt delivery.

In order to undertake, with reasonable assurance of early completion, the large number of additional destroyers which the military situation renders desirable, it will be necessary to provide entirely new facilities for building the hulls and machinery and their appurtenances. The Navy Department has been in conference with various shipbuilders and machinery builders of experience in destroyer work, and is assured that it is physically possible to provide these additional facilities. It will be desirable to locate those which are not necessarily on the seaboard in the interior of the country, in order to facilitate obtaining the necessary labor, which is in scant supply in shipbuilding trades at present.

It is evident that if the new destroyer program is carried out as above outlined, the Government will find itself at the end of the war in possession of numerous plants and facilities for which it will then have no use. The present tendency of the Navy Department is to acquire facilities of this kind and to plan for their utilization after the war is over, in accordance with the policy calling for a constantly increasing percentage of Government construction and manufacture. The lesson of the war has been pretty thoroughly digested by the War Department, the activities of which have been almost paralyzed because private manufacturers have had no adequate facilities for co-operating with the

Government in supplying small arms, artillery ammunition, etc., for the new national army. The Navy Department, however, is apparently still obsessed with the idea that the Government should undertake the largest possible proportion of whatever construction or manufacturing may be necessary, notwithstanding the obvious fact that when the war is over it will have very little use for the facilities it is now so eager to acquire.

Busy in the Mahoning Valley

All of the 25 blast furnaces in the Mahoning Valley, which embraces the Youngstown district, were in blast on Sept. 1. The largest single producer in the Youngstown district is the Carnegie Steel Co., which has six blast furnaces at the Ohio works, making about 3,000 tons or more of metal per day. The next largest is the Youngstown Sheet & Tube Co., with six blast furnaces, making nearly 3,000 tons per day, and the Republic Iron & Steel Co. comes next with five blast furnaces, making about 2,000 tons of metal per day. The latest new stack of the Republic Company was blown in recently, and will average about 550 tons per day. The company also owns Hall furnace at Sharon, and Atlantic furnace at New Castle, Pa. The Brier Hill Steel Co. owns two stacks making 800 to 900 tons per day, the Girard Iron Co., one stack, 300 tons per day, Ohio Iron & Steel Co., one stack, 350 tons per day, McKeefrey Iron Co., one stack, 300 tons per day, the Struthers Furnace Co., one stack, making about 450 tons per day.

For some time the demands made upon the manufacturers of steel furniture for their products have been extremely heavy, and they promise to continue very large for some time to come. In order to meet its fast growing trade in Allsteel, the General Fire Proofing Co., of Youngstown, Ohio, has recently greatly enlarged its plant, adding about 30 per cent more floor space, and installing a large amount of new machinery.

The Brier Hill Steel Co., Youngstown, recently bought considerable ground adjacent to the plant of A. M. Byers Co., Girard, Ohio, which adjoins property already owned by the Brier Hill Steel Co. This purchase gave rise to the report that the Brier Hill Steel Co. might take over the A. M. Byers Co., which is incorrect.

American International Corporation in the Steel Business

The American International Corporation has organized a new subsidiary, the American International Steel Corporation, to engage in the export of steel and steel products. The new company intends to develop a foreign selling organization, and of course will have the financial and shipping connections of the American International Corporation.

Edward M. Hagar, for many years president of the Universal Portland Cement Co., the subsidiary of the United States Steel Corporation engaged in making cement from blast-furnace slag, is president. Morris Metcalf, identified in 1896 with the Illinois Steel Co. at the time of the early slag cement making experiments and for years assistant to Mr. Hagar, is vice-president, and J. W. Hook, of the Allied Machinery Co., a subsidiary of the American International Corporation, is also a vice-president of the new company. Offices have been established in London and Buenos Aires and the general offices of the company are in the Equitable Building, 120 Broadway, New York.

The A. Leschen & Sons Wire Rope Co. has completed and formally opened a new office and headquarters building adjoining its plant at St. Louis at a cost of $140,000. Included in the structure, in addition to complete provision for the general offices in commodious quarters handsomely finished and furnished, are dining, rest and shower rooms for the employees, while adjoining the building arrangements have been made for the laying out of a tennis court and also a golf course. The building is three stories, with the dining rooms and kitchens on the top floor. The structure, fireproof, is of the most complete daylight character.

HIGHEST WAGES EVER PAID

New Record for Puddlers and for Mill Workers—Patriotic Appeal

YOUNGSTOWN, Sept. 4.—The bi-monthly examination of the sales sheets of the Western Bar Iron Association, Republic Iron & Steel Co., and Cleveland Rolling Mill Co. to determine the price to be paid puddlers and bar mill workers for the months of September and October was held in this city Friday, Aug. 31, when the average selling price was established on a 2.75 card basis, an advance of two points. This fixes another new mark in the history of the trade. Therefore the the months of September and October the rate for puddlers will be $13.30 a ton. This is 50 cents a ton above the rates paid in July and August. Bar mill workers receive an increase of about 5 per cent. James H. Nutt, secretary of the Western Bar Iron Association, stated Friday that he did not look for any decline in the wages paid puddlers and bar mill workers during this year. Boiling prices may even advance another point or two.

The 60 days' examination of the sales sheets of the steel sheet and tinplate mills operating under the wage scale of the Amalgamated Association will be held here as usual on Sept. 10.

A. M. Byers Co., operating a large puddling plant at Girard, Ohio, and the Youngstown Sheet & Tube Co., operating a puddling plant at East Youngstown, Ohio, do not sign the Amalgamated scale, but always pay the Amalgamated rate, or higher.

A Patriotic Appeal to Employees

J. B. Rider, vice-president and general manager of the McKees Rocks plant of the Pressed Steel Car Co., Pittsburgh, has issued a personal appeal to the thousands of employees of that company in a circular letter that has been printed in 29 languages, and reads as follows:

To Every Worker of the McKees Rocks Plant:

This plant is engaged on important work for the United States government.

Our country—the United States of America—is in a big and serious war, the greatest of all wars. Every item of material being gotten out at this plant is needed by the railroads and the government to help win the war and quickly bring peace to the whole world. Each one of you can have a part in this—

By staying at your job every day and avoid losing time.

By willingly, when you are able, working extra hours upon being asked by your foreman to do so, or by telling your foreman you are willing to work extra hours.

By speeding up the job you are working at to get more done in a day's time.

By showing your fellow workers that you are anxious to do "your bit" for the flag that protects yourself, home, and family.

Our country needs us now. This is the time to show your loyalty. Are you one of us?

British Pig-Iron Output Increasing

The British output of pig iron is increasing rapidly. According to the quarterly blast-furnace report of the London *Iron and Coal Trades Review*, the average number of furnaces in blast per quarter, omitting fractions, is as follows:

	1916	1917
First quarter	288	315
Second quarter	292	322
Third quarter	297	...
Fourth quarter	306	...

Eight blast furnaces were in course of construction on June 30. The average number operating in 1916 was 296, while the average for the second quarter of 1917 was 322. The number in blast on June 30 was 324, or an increase of nearly 10 per cent over the average for last year.

The Bethlehem Steel Co. is making improvements and extensions at its Lebanon, Pa., furnaces to increase the capacity of the plant.

ESTABLISHED 1855

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War Taxes and New Construction

While there has been a pronounced majority against the most drastic of the war tax proposals in the Senate in the past week, it is apparent that the cost of putting excessive burdens upon industry in the first year of this country's participation in the war has not been carefully counted. When the first estimates of the year's war appropriations came out, in figures that were but a fraction of those indicated in the latest revisions, there was evident recognition of the wisdom of carrying forward a large part of the war's financial burdens in the form of bond issues. But as the initial figures have grown, and we have almost over night fresh billions added, the idea is advanced that so-called war profits must be put under heavier tribute.

It has been decided in the votes already taken in the Senate that the Government levy will not be 80 per cent or 70 per cent of such profits, but the percentage in any event will be a large one. And it is certain that in whatever form these profits exist, whether represented in enhanced inventories at the high prices of to-day or in a larger volume of bills and accounts receivable, or in added real estate or plant, the Government at the time appointed must have its share in cash. The process is therefore the taking from industry, nine or ten months hence, of hundreds of millions of dollars and its transfer to the Government. Preparatory to the handing over of these immense sums, business must husband its resources and convert paper profits into cash, every activity being subordinate to the one operation of getting a large part of its assets into liquid form to turn over to the Government.

Some idea of the scale of such withdrawals is given in the statement of Senator Simmons in Monday's debate, that with profits in 1917 estimated at $480,000,000, the Steel Corporation under the Finance Committee's amendment would be subject on a large part of its profits to a tax of 60 per cent and would have to pay to the Government $183,734,000. Steel manufacturers are asking what is to become, in such a situation, of the extensions which are now under way in the industry and all of which have been considered necessary to meet the imperative and increasing demand for steel for the carrying on of the war. The Bethlehem Steel Corporation financing just announced suggests that the phenomenon of large war profits may also be accompanied by the necessity of providing at high cost for vast capital requirements, where new work is under way on a large scale. But not all companies could be as successful as Bethlehem in commanding money for construction at double the normal outlay for new plant and for carrying on business on to-day's unparalleled values, while at the same time hoarding cash against the day of settlement with the Government. In many cases the alternative would be that with which the railroads have long been acquainted—the putting off of new work and the limiting of operations to what can be done without mortgaging the future.

The steel industry in the past three years has made free use of profits in adding to capacity and many plans for further extensions are now in the middle stage. To-day there is grave doubt of the carrying out of such plans if the voice of those who would bind upon industry an inordinate share of the cost of the war in a single year is allowed to prevail.

No War After the War

President Wilson's letter to the Pope has sounded the death knell of the war-after-the-war plan of the Entente Powers, agreed upon at the Paris economical conference, for the punishment of Germany after the conclusion of peace. The President's statement that "no peace can rest securely upon political or economical restrictions meant to benefit some nations and cripple or embarrass others," is clearly a declaration against any such plan as that which was adopted at Paris. He states very positively that the wrongs done by Germany in this war ought to be repaired, but that "punitive damages, the dismemberment of empires, the establishment of selfish and exclusive economic leagues would, in the end, be worse than futile, no proper basis for a peace of any kind." The President establishes the basis of settlement on a very high plane, and it was a courageous act to show very positively that one part of the program of England, France and Russia would not be participated in by the United States.

When it was first announced that plans were being laid for an economic war after the present bloody conflict, the people of this country naturally recoiled from being a party to any such conduct of warfare, but at that time the United States was not a belligerent and there was no immediate danger that it would be called upon to engage in commercial warfare. When in due time a state of war was declared, there was no announcement as to what the United States would do in regard to trading with the Central Powers after the establishment of peace, and it was well for the President in his letter to Pope Benedict to set at rest any doubt on this subject. It is gratifying to note that the press of foreign nations does not take exception to his position. Naturally, after the war, nations which have been associated in a common cause will prefer to trade with each other; but to a large extent, business will seek its natural channels, and this is as it should be. To attempt to carry on commercial war would be to keep alive the animosities of the present world catastrophe and help in bringing about an even greater world conflict at some future time.

Destroyers or Shipping?

After the delays in the carrying out of the merchant shipping program due to the Goethals-Denman controversy there has arisen a feeling of impatience in the past week over the proposal of the Secretary of the Navy to place under construction 150 additional destroyers, when it is admitted that the carrying out of the program will retard the building of merchant ships.

It may be granted, no doubt, that the 150 destroyer program is undertaken upon the advice of Admiral Sims, who is right on the spot and knows the value of destroyers, but it is a case of every man to his trade, and the warrior naturally wants to fight. Ships are also a good thing, and what is needed is the temperate judgment of one who is not committed to either method of winning the war, but one who can dispassionately weigh the relative value of the different measures proposed to help win the war, in terms of human life, of time, and of the expenditure of money. The new destroyer program has one thing to commend it, for there is the well-tried adage that "An ounce of prevention is worth a pound of cure."

Quite incidentally, when so much is at stake, is the point that the destroyer program would decrease somewhat the consumption of steel plates, as compared with expectations hitherto entertained, for the amount of time and work involved in proportion to the plate tonnage consumed, is very much greater with destroyers than with merchant ships. Perhaps this is one of the various influences that have lately been developing a rather easier tone in the plate market, though it cannot be more than a minor influence.

The Labor Department in Washington recently has been flooded with inquiries from manufacturers in regard to the new Federal child labor law, and a summary of the new statute and regulations for its enforcement is published elsewhere in this issue of THE IRON AGE. The law was fought bitterly by some of the cotton mill operators of the South, and the decision rendered in North Carolina last week, declaring it unconstitutional, does not cause any surprise. It merely paves the way for a final decision by the United States Supreme Court. In recent years, particularly in the Northern States, the employment of minors has rapidly diminished, and it is not probable that if the new law is sustained it will have any important effect on plants manufacturing iron and steel, but in some metal-working operations large numbers of minors have been discharged within a few days.

War and Wealth

The *Wall Street Journal* recently estimated the cost of the war to all the belligerents up to Aug. 1 at $90,000,000,000. The Manchester *Guardian* has since published an estimate setting the total at $107,500,000,000. The discrepancy is a minor one, in the circumstances, and one may adopt one hundred billion as a safe working estimate.

That is many times the amount that it was thought before the war would bring any war to a conclusion. It was thought that a first-class country could not stand an expense of more than a very few billion. As soon as the war was well under way, however, comparisons began to be made between the war expenditures of a country and its total wealth, and the idea gradually developed that a country could afford, and if necessary would afford, to spend in war what would amount to a large proportion of its wealth. It is impossible to present any close approximation to the material wealth of the European belligerents; but it may be noted that the hundred billion they have spent is not very far short of the estimated total wealth of the United States. Our own expenditures are not included in the estimates quoted above, as they were inconsequential up to Aug. 1; but Secretary McAdoo appears to be thinking in terms of twenty billions for our part, a considerable portion of this, of course, to figure as future expenditures of our Allies.

The return for this expenditure is to be future happiness and safety. At the end of the war there will be very little indeed of material things to show for the expenditure. There will be some factory equipment left that will be of certain or uncertain value, but representing at best only an extremely small part of the expenditure.

We have been considering only the expenditure of money. In its simplest aspect it really represents eventually the payment of wages, and wages would be paid in any event, if the times were prosperous. Very little material wealth has been taken directly. The expenditure has been chiefly for things that have been made during the war, and for services that have been rendered. On the other hand, some wealth that existed at the beginning of the war has been destroyed. There has been a great deterioration in railroad and manufacturing equipment, as well as in shipping, all due to very hard driving, while on the other side of the ledger there have been such additions as can be properly employed after the war. Instead of considering the expenditures of the governments, expressed in money, a clearer view of the material wealth of the belligerent countries is to be obtained by con-

sidering the nature of their activities in war and in peace. In prosperous peace times nearly everybody is working, and the net result usually is a great increase in material wealth year by year, to which most economists would add the "unearned increment." In war, however, the work of all at the front, as well as of those who serve them by transporting to them food, munitions and other things, is entirely lost. The work of those at home engaged in making the necessities of war is also lost, because there is no contribution to the material wealth. When, as in France and England, practically the entire man and woman power is engaged in furthering the prosecution of the war, the usual increment in wealth does not occur, but on the other hand there is great deterioration.

So it will necessarily be in our own case, when the expenditures run into many billions of dollars a year, only a small part of the expenditure being appraisable as material wealth at the close of the war. We shall, it is hoped, have many of our ships, if we ever build them, and we shall have some railroad equipment in France, together with a few other things. But when we think of these many billions it is well to apply the measure that the total capitalization of our whole steam railroad system is only about twenty-one billions, and there are some who think that is more than they are worth.

There are two practical conclusions: that every one should endeavor to work harder than in peace times, that the loss in wealth may be kept down, and that no class of individuals should make inordinate additions to their own wealth. Nor, as a corollary, should there be a dissipation of current earnings by extravagances, whether of the wealthy or of the workmen. Against such restraint as it is incumbent upon all to exercise now, there is the promise that in the new conditions that will follow the war there will be magnificent opportunites for a rapid increase in the material wealth of the world.

A Record in Manganese Products

The war has given the United States the lead in another branch of the world's steel industry. Manganese ore imports for the fiscal year ended June 30, 1917, at 656,088 gross tons, exceed the records of Great Britain in some of the best years of the industry in that country. Great Britain's receipts in 1913 were 601,177 gross tons and have been much less since, as they were also before that year. The importance to the steel industry of this remarkable import movement has been dwelt on before, but the facts have not been generally appreciated.

With 80,000 tons as the estimated domestic output of high grade ore in 1917, there will be available in the United States for conversion into ferromanganese this year over 700,000 tons of ore. This means a theoretical production of 270,000 to 280,000 tons of 80 per cent alloy. The blast-furnace reports of THE IRON AGE show a production this year of 143,302 tons to Aug. 1, or at the rate of 245,652 tons for the year, with the output increasing each month. Imports from Great Britain are declining, with indications now pointing to a total for the year of not over 50,000 tons. It is thus evident that the entire available supply, if the domestic output is 270,000 tons, will not be seriously short of the Alloy Committee's estimate of 336,000 tons as the present yearly consumption. The shortage will probably be made up by a more efficient use of spiegeleisen.

Before the war Great Britain led as a manufacturer and exporter of ferromanganese. To-day the United States outranks that country as a producer, though not as an exporter, for the entire domestic product is needed at home.

Manufacturing concerns engaged in work which contributes directly or indirectly to the successful prosecution of the war—and their name is legion—have been very properly described as fighting industries, but they will not be able to fight very effectively unless labor is loyal and enthusiastic. The 7000 men in the Philadelphia navy yards struck the nail squarely on the head when they pledged their loyal support to their country's cause and said: "We desire by our example to stimulate all others to the fullest performance of their duty to the country at this time." In other directions the labor situation is improved and the action of the mine workers of Alabama in withdrawing their demand for recognition of the union is one of the latest and most gratifying developments.

What before the war would have been regarded as an exceedingly high price in itself has lately represented the spread between tank and hull quality plates. For weeks this difference has been 2 cents per pound or $40 per ton, and must largely be reckoned as covering inspection or mill expense in halts in the rolling process to determine quality and in rejections of a commodity in urgent demand. With plate prices tottering, as at present, much of this spread is likely to disappear. But the condition has not been confined to plates. Shapes subject to mill inspection have been sold at $20 per ton above ruling levels, a demand made by the mill as a measure of protection at a time when run of mill output without inspection would have meant a much desired increase in output.

CORRESPONDENCE

Centennial of the First Rolling Mill in the United States

To the Editor:—You may be aware of it, but doubtless many of your readers are ignorant of the fact that previous to Sept. 15, 1817, all the bar and plate iron made in the United States was *forged* into dimensions. On that date the first *rolled* bar of iron was turned out at Plumpsack (or Plumsock), Middletown, Pa., about midway between Connellsville and Brownsville, in Fayette County.

Col. Isaac Meason of Connellsville furnished the money to erect and to run the first iron rolling mill in the United States. Thomas Cotton Lewis, Sr., master mechanic, a Welsh immigrant, was the designer, constructor, engineer and superintendent of this mill. His brother, George Lewis, was the "roller and turner"; Samuel Lewis, a second brother, was the heater; James Lewis, the youngest brother, was the "catcher"; Henry Wenman Lewis, another brother, was the bookkeeper

and "clerk"; Samuel Cotton Lewis and Thomas Cotton Lewis, Jr., his sons, "pulled up" for the puddler, David Adams, and for the "refiner," James Pratt.

From this small acorn of a mill there has grown within a century a forest. Rolling mills have been built all over the country, North and South, East and West—the Carnegie Steel Co., Illinois Steel Co., Cambria Iron Co., Colorado Fuel & Iron Co., the Tennessee Coal, Iron & Railroad Co., the Youngstown companies, and hundreds of others—every company that rolls iron or steel.

Sept. 15, 1917, is the centennial of this epochal step in the iron industry of our country. Middletown is the spot for a monument. Col. Isaac Meason, Thomas Cotton Lewis, Sr., and his brothers are the men to be honored in history as pioneers in our great rolling mill development. RICHARD GREGG LEWIS.

Dayton, Ohio, Aug. 30, 1917.

[Swank's "Iron In All Ages" says that the first rolling mill erected in the United States to puddle iron and roll iron bars was built by Isaac Meason in 1816 and 1817 at Plumsock on Redstone Creek, in Fayette County, on the site of the rolling and slitting mill built by Jeremiah Pears before 1804. The mill was built "for making bars of all sizes and hoops for cutting into nails. The iron was refined by blast and then puddled." The mill contained two puddling furnaces, one refinery, one heating furnace and one tilt hammer. Raw coal was used in the puddling and heating furnaces and coke in the refinery. The rolls were cast at Dunbar furnace and the lathe for turning the rolls was put up at the mill. The mill went into operation on Sept. 15, 1817. A flood in the Redstone caused its partial destruction in 1831. The machinery was subsequently taken to Brownsville.—EDITOR THE IRON AGE.]

Contract Foundry Iron Less Than Half Current Market Prices

Consumers of Southern foundry iron who have been under the necessity of buying iron for early delivery will probably be surprised to learn that the average of monthly invoice prices of iron shipped this year up to Aug. 1 is between one-third and one-half the market quotations of the past few months. As is well known, contract shipments have made up most of the iron that has been moving from furnaces, and these contracts were largely made before the market began its sensational advance.

The following table shows in round figures the monthly averages of invoice prices on all grades of Southern foundry iron for the first seven months of the year, the data being compiled from the books of a large Southern iron merchant:

January	$15.30
February	16.90
March	16.35
April	16.90
May	18.80
June	19.95
July	21.50

The above prices are all f.o.b. Birmingham, Ala. The average of the seven monthly averages is $17.96. Southern No. 2 foundry iron has sold for some weeks at $47 to $50, Birmingham. It is probable that August invoices for contract iron averaged slightly less than half the price of prompt iron in that month.

Hon. Frank Cochrane, Minister of Railways, states that it is the intention of the Canadian Government to spend $25,000,000 on the purchase of locomotives and rolling stock for the Government railways and freight cars to supply the shortage on other railroads. In all, 6,000 freight cars are being purchased, 4,000 from the Canada Car Co.; 1,000 from the Eastern Car Co.; 1,000 from the National Car Co.

The T. P. Walls Tool & Supply Co., 75-77 Walker Street, New York, has been incorporated with a capital stock of $50,000. T. P. Walls is president.

CONTENTS

OUTPUT STILL FALLING

August Pig-Iron Production 3,247,947 Tons

Five New Steel Works Furnaces Started, but Coke Shortage Still Dominates

The country's production of pig iron in August fell off considerably from that in July, in spite of the fact that five new modern furnaces were blown in last month and that there was a net gain of six in the number of furnaces in blast. Coke scarcity is still the controlling factor and there was also in the early part of the month the drawback of heat and humidity. The total output of coke and anthracite furnaces was 3,247,947 gross tons or 104,772 tons a day as against 3,342,438 tons in July or 107,820 tons a day. The falling off in the production of steel works furnaces was about 5000 tons a day while the output of merchant furnaces increased about 2000 tons a day, making a net decrease of about 3000 tons per day. On Sept. 1 the estimated capacity in blast was 110,165 tons a day, reckoning on the basis of the performance of the furnaces in the few months preceding August, the expectation being that with cooler weather in September output will increase.

The new furnaces started in August were one Donner at Buffalo, the new B furnace of the Bethlehem Steel Co. in the Lehigh Valley, No. 3 Worth at Coatesville, Pa., No. 5 Haselton in the Mahoning Valley and the new furnace of the Whitaker-Glessner Co. at Portsmouth, Ohio. Most of these furnaces were blown in in the latter part of the month and therefore were no large figure in the August returns.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from August, 1916, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons

1916	Steel Works	Merchant	Total
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113 189
November	80.141	30,253	110,394
December	74,264	28,273	102,537
January, 1917	72,394	29,249	101,643
February	65,280	29,193	94,473
March	73,731	31,132	104,863
April	79,031	32 134	111,165
May	77,561	32,677	110,238
June	76,805	32,197	109,002
July	76,440	31,380	107,820
August	71.436	33,336	104,772

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in August and the three months preceding:

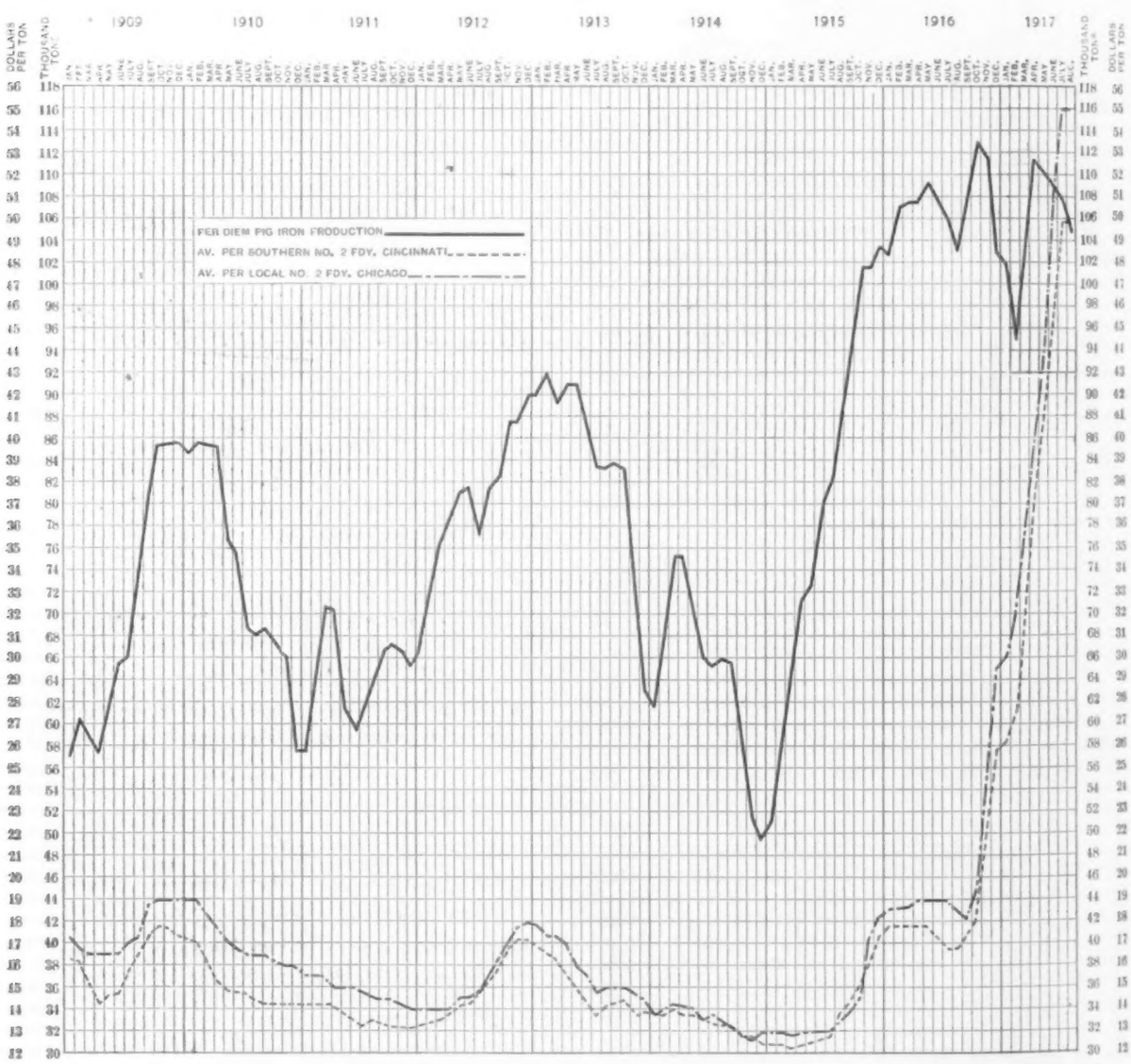


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1908, to Sept. 1, 1917; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Monthly Pig-Iron Production—Gross Tons

	May (31 days)	June (30 days)	July (31 days)	Aug. (31 days)
New York	198,111	193,198	194,255	178,841
New Jersey	9,485	14,340	18,990	21,315
Lehigh Valley	117,584	114,465	116,432	111,583
Schuylkill Valley	100,531	94,097	94,578	91,236
Lower Susquehanna and Lebanon Valley	83,985	79,989	84,540	88,295
Pittsburgh district	690 919	651,768	664,456	664,141
Shenango Valley	176,200	171,074	174,614	164,709
Western Pennsylvania	211,621	202,145	215,192	213,731
Maryland, Virginia and Kentucky	106,768	99,238	89,603	83,233
Wheeling district	129,169	125,403	129,689	124,627
Mahoning Valley	335,797	307,829	322,165	300,740
Central and Northern Ohio	276,712	278,396	299,458	272,109
Hock. Val., Hang. Rk. & S. W. Ohio	55,544	60,866	55,186	59,577
Chicago district	506,297	489,780	503,946	503,723
Mich., Minn., Mo., Wis. and Col.	122,312	118,109	114,952	105,486
Alabama	260 969	234,259	231,738	232,355
Tennessee and Ga.	35,336	35,099	32,644	32,246
Total	3,417,340	3,270,055	3,342,438	3,247,947

Capacity in Blast Sept. 1 and Aug. 1

The following table shows the daily capacity in gross tons of furnaces in blast Sept. 1 and Aug. 1 by districts:

Coke and Anthracite Furnaces in Blast

Location of furnaces	Total number of stacks	Sept. 1 Number in blast	Sept. 1 Capacity per day	Aug. 1 Number in blast	Aug. 1 Capacity per day
New York:					
Buffalo	18	18	5,885	17	5,705
Ferro	1	1	50	1	50
Other New York	5	2	405	3	665
New Jersey	4	4	855	3	605
Ferro	1	1	50	0	0
Pennsylvania:					
Lehigh Valley	21	15	3,755	14	3,542
Spiegel	2	2	205	2	214
Schuylkill Val.	13	11	3,155	10	2,960
Spiegel	1	1	90	1	95
Lower Susquehanna	8	7	1,720	6	1,577
Ferro	1	1	50	0	0
Lebanon Valley	8	8	1,060	8	1,055
Ferro and Spiegel	3	2	100	2	105
Pittsburgh Dist.	53	50	22,740	48	22,020
Ferro and Spiegel	4	4	440	4	555
Shenango Val.	19	17	5,250	18	5,645
Western Pennsylvania	25	23	6,853	23	6,885
Ferro and Spiegel	3	2	125	1	84
Maryland	3	3	916	3	952
Ferro	1	1	100	1	95
Wheeling District	14	12	4,220	12	4,183
Ohio:					
Mahoning Val.	26	26	10,690	25	10,392
Central and Northern	26	24	9,255	25	9,661
Hocking Val., Hang. Rk. and S. W. Ohio	17	16	2,175	15	1,858
Illinois and Ind.	36	33	16,180	33	16,145
Ferro	1	1	65	1	66
Michigan, Wis. & Minn.	12	10	2,355	10	2,472
Colo. and Mo.	6	4	1,052	4	1,084
Ferro	1	1	98	1	86
The South:					
Virginia	18	12	1,324	12	1 376
Kentucky	5	3	375	4	558
Alabama	37	31	7,457	31	7,410
Ferro	1	1	70	1	68
Tenn. and Ga.	16	11	1.045	12	1,080
Total	410	357	110,165	351	109,248

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	Pig, total production 1915	1916	1917	Spiegeleisen and ferromanganese 1915	1916	1917
Jan.	1.115,944	2,251,035	2.244,203	18,041	24.866	38,792
Feb.	1,237,380	2,183,845	1,829,846	13.319	23,877	32.137
Mar.	1,551,082	2 365,116	2,285.430	12.274	29,388	36,563
Apr.	1,584,111	2,316,768	2,370,937	12,337	31,862	39,595
May	1.694.290	2,408,890	2.404.380	13,440	35,844	37,701
June	1,770,657	2,295,784	2,304,155	19.200	38,597	30,829
July	1,949,750	2.306,303	2,369 630	17,854	31,353	43,884
Aug.	2,101,818	2,313.122	2,214,513	27,463	33,338	39.492
Sept.	2,129,322	2,309,710	.....	23.159	29,451	.....
Oct.	2,281,456	2,530,806	.....	23,992	34,566	.....
Nov.	2,198,459	2,404,210	.....	28,741	44 975	.....
Dec.	2,283,047	2.294,620	.....	25,004	43,470	.....

Among furnaces blown in in August were one Donner at Buffalo, Nos. 1 and 2 Wharton in New Jersey, one Lock Ridge in the Lehigh Valley, one Worth in the Schuylkill Valley, Lochiel and Vesta in the lower Susquehanna Valley, one Eliza and one Monongahela in the Pittsburgh district, Marshall in western Pennsylvania, one Haselton in the Mahoning Valley, Portsmouth in southern Ohio, and one Vanderbilt in Alabama.

Among furnaces blown out were Genesee in New York, one Farrell in the Shenango Valley, Oriskany in Virginia, one Ashland in Kentucky, one Lorain (banked) in northern Ohio, one Oxmoor in Alabama and Napier in Tennessee.

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons

	1913	1914	1915	1916	1917
Jan.	2,795,331	1,885,054	1,601,421	3,185.121	3,150,938
Feb.	2,586,337	1,888,670	1,674,771	3,087,212	2,645,247
Mar.	2,763.563	2,347,867	2,063.834	3 337,691	3,251.352
Apr.	2,752,761	2,269,655	2,116,494	3,227,768	3.334,960
May	2 822,217	2,092.686	2,263,470	3.361,073	3.417,340
June	2,628.565	1.917,783	2,380.827	3,211,588	3,270,055
July	2,560.646	1,957.645	2,563.420	3 224,513	3,342,438
Aug.	2,545,763	1,995,261	2,779.647	3 203,713	3.247,947
8 mo.	21,455,183	16,354,621	17,443,884	25,838,679	25,660,277
Sept.	2,505,927	1,882,577	2,852,561	3,202,366	.....
Oct.	2,546,261	1,778,186	3,125.491	3,508,849	.....
Nov.	2,233,123	1,518,316	3.037,308	3,311,811	.....
Dec.	1,983.607	1,515,752	3,203.322	3.178,651	.....
Total, yr.	30,724,101	23,049,752	29,662,566	39,039,356	.....

The figures for daily average production, beginning January, 1910, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1910—Gross Tons

	1910	1911	1912	1913	1914	1915	1916	1917
Jan.	84,148	56,752	66,384	90,172	60,808	51,659	102,746	101.643
Feb.	85,616	64,090	72,442	92.369	67,453	59,813	106,456	94,473
Mar.	84,459	70,036	77,591	89.147	75,738	66,575	107,667	104,882
Apr.	82,792	68,836	79,181	91,759	75,665	79,550	107,592	111,165
May	77.102	61,079	81.051	91,039	67,506	73,015	108,422	110,238
June	75.516	59,585	81,358	87,619	63.916	79,361	107,053	109,002
July	69,305	57,841	77,738	82,601	63.150	82,691	104,017	107,820
Aug.	67,963	62 150	81 046	82,057	64,363	89,666	103,346	104,772
Sept.	68,476	65,903	82,128	83 531	62,753	95,085	106,745	.....
Oct.	67.520	67,811	86,722	82,133	57 361	100,822	113.189	.....
Nov.	63,659	66,648	87,697	74,453	50,611	101,244	110,394	.....
Dec.	57,349	65,912	89,766	63,987	48,896	103,333	102,537	.....

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1909, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Heavier Pig-Iron Loading

The official bulletin of the Railroads' War Board dated Aug. 30, in telling how shippers are co-operating in the effort of the railroads to increase freight service without increasing equipment, says that an iron company in New York State that formerly loaded pig iron to 90 per cent of the marked capacity of its cars, increased its loading to 107.2 per cent during the period July 15 to July 31 inclusive.

Open-hearth furnaces in operation in Great Britain in 1916 were 502, of which 349 were acid and 153 basic. The total furnaces in existence in 1916 were 611, of which 432 were acid and 179 basic, making 82 acid and 26 basic furnaces idle.

The Rossville Silk Mills, New Berlin, N. Y., has let contract for mill addition 56 x 150 ft., 1 story, to cost $22,000. W. T. Hawe, manager, 356 Fourth Avenue, New York.

Rathbone, Sard & Co., Grange Sard, president, North Ferry Street, Albany, are having plans prepared for rebuilding a factory 200 x 250 ft., 4 stories.

Iron and Steel Markets

SOME EASING IN PRICES

Little Light on Coming Adjustments

Plates and Bars Lower and Semi-Finished Steel Is Weaker

The magnitude of the Government's task in fixing steel prices is shown in repeated postponement of action. In the past week, prominent producers have been called upon for additional data, and there is still no appointment for the expected meeting of the War Industries Board and the general committee of steel manufacturers.

The markets for pig iron, semi-finished steel and rolled products continue to drift. Indications of coming readjustments are chiefly those given by resale transactions, which are but meager basis for conclusions. At Pittsburgh there has been no duplication of the sales in steel-making pig iron, which in the last week of August showed a softening market, but offers of resale billets and slabs at $70, as against $100 in July, are ample comment on the disappearance of competitive buying of shell steel for Europe.

The August pig-iron statistics emphasize again the little success of blast-furnace operators in the face of coke scarcity. The output was 3,247,947 tons, or 104,772 tons a day, against 3,342,438 tons in July, or 107,820 tons a day. New modern blast furnaces were started last month at five steel plants —Midvale, Bethlehem, Donner, Republic and Whitaker-Glessner—yet with all this reinforcement production declines. Many furnaces were banked for days at a time for lack of coke.

On Sept. 1 357 furnaces were in blast, with daily capacity of 110,165 tons, while 351 furnaces with daily capacity of 109,248 tons were active on Aug. 1. The situation is well indicated by the fact that 25,660,000 tons of pig iron was produced in the first eight months of the year, or 175,000 tons less than in the first eight months of 1916, and yet 38 more furnaces were in blast at the opening of this month than on Sept. 1, 1916.

The course of the market in the interval of waiting for the heavy requisitions of ship steel for the Government is the immediate concern of makers and buyers. Some of the 400,000 tons of plates bought for Japan are available for home consumption, and sales at 8c., Pittsburgh, indicate the change that has already come. From mills having 10c. plate contracts there is complaint in some instances of the failure of buyers to specify.

The bar market has been attracting attention also. Contract sales of steel bars have been made at 4c., Pittsburgh, for delivery in the fourth quarter, and some deliveries at that price have been as good from the buyer's standpoint as have been secured only recently on a 5c. basis. At the same time, when round lots of bars have been sought for Japan, with no embargo in effect, only fractional parts have been accepted at 4.50c.

A large meeting of tin-plate manufacturers at Pittsburgh, Aug. 31, considered the request from the food administrator that contracts with canners be made for a full year instead of six months. The question of sheet bar contracts for an entire year is involved, and negotiations with the steel mills on that matter must first be taken up. The draft of tin-plate workers for war service figures in calculations for the coming year's output, and there is the possibility of cutting off one turn at some mills in view of labor shortage.

Wire rods have shown consistent strength. On 6000 tons for shipment abroad through this month, October, and into November, $95 was done for soft and $115 for high-carbon stock.

Some light is thrown on the proposal at Washington that the Entente Allies be given the same prices on American steel as the Government, by British market prices on hematite pig iron. Recently the British maximum home trade price was 122s. 6d., while the export price for France was 137s. 6d., f.o.b., and for Italy, 142s. 6d. Our cable advice this week is that the export price for the Allies is believed to have been fixed at 141s. No publication has been made by Great Britain thus far of the prices charged her allies for finished steel, but in justice to steel makers in this country who are asked to make preferential prices to Europe these figures should be forthcoming.

The market for foundry pig iron is uniformly easier, due to constant offerings of resale iron, but the concessions are not great, nor is the business considerable. Some foundrymen bought more iron for 1917 than they will need; others are pressing the furnaces for deliveries. In the East, $50 No. 2 foundry iron is now offered, as against a recent furnace price of $52.

A new high level for manganese ore was reached in recent sales of ore from India at $1.25 to $1.30 per unit, at Atlantic seaboard. The freight from India, at £6 per ton, represents nearly half the cost of the ore.

The Lake Superior iron-ore movement in August was 10,146,786 tons, or slightly less than in July. To Sept. 1, shipments were 36,523,554, or 2,692,310 tons less than to Sept. 1 last year. That the 1916 total will not be reached is quite certain, but even so there is likely to be more ore than there will be coke to smelt.

Pittsburgh

PITTSBURGH, Sept. 4.

The local steel market is still marking time, waiting for the Government to announce its prices for steel, which it is now hoped will be done within a very short time. In the meantime, consumers are not buying a pound of material that is not absolutely needed, and in a few cases requests have been made to hold up shipments on contracts, at least in part, until the situation is more clearly defined. It is now conceded that the crest in prices has been reached, and that lower values on steel products of all kinds are certain to come in the near future. The heaviest declines in prices so far have been in semi-finished steel, soft Bessemer and open hearth, billets and slabs having been offered as low as

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Sept. 5, 1917.	Aug. 29, 1917.	Aug. 8, 1917.	Sept. 6, 1916.
No. 2 X, Philadelphia....	$53.00	$53.00	$53.00	$19.50
No. 2, Valley furnace...	52.00	52.00	53.00	18.25
No. 2 Southern, Cin'ti...	49.90	49.90	49.90	16.90
No. 2, Birmingham, Ala.	47.00	47.00	47.00	14.00
No. 2, furnace, Chicago*.	55.00	55.00	55.00	18.50
Basic, del'd, eastern Pa.	50.00	50.00	50.00	19.75
Basic, Valley furnace...	48.00	48.00	52.00	18.00
Bessemer, Pittsburgh....	51.95	51.95	55.95	21.95
Malleable Bess., Ch'go*..	55.00	55.00	55.00	19.00
Gray forge, Pittsburgh..	46.95	46.95	46.95	18.70
L. S. charcoal, Chicago..	58.00	58.00	58.00	19.75
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh..	75.00	75.00	90.00	45.00
O.-h. billets, Pittsburgh..	75.00	75.00	90.00	45.00
O.-h. sheet bars, P'gh....	80.00	80.00	90.00	45.00
Forging billets, base, P'gh	100.00	100.00	125.00	69.00
O.h. billets, Phila.....	90.00	90.00	100.00	48.00
Wire rods, Pittsburgh....	90.00	90.00	95.00	55.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia..	5.185	5.185	4.659	2.659
Iron bars, Pittsburgh....	4.75	4.75	4.75	2.60
Iron bars, Chicago.....	4.50	4.50	4.50	2.35
Steel bars, Pittsburgh...	4.00	4.00	4.50	2.60
Steel bars, New York....	*4.195*	4.695	4.669	2.769
Tank plates, Pittsburgh.	8.00	8.00	9.00	4.00
Tank plates, New York..	8.945	8.945	10.169	4.169
Beams, etc., Pittsburgh..	4.00	4.00	4.50	2.60
Beams, etc., New York..	*4.445*	4.695	4.669	2.769
Skelp, grooved steel, P'gh	4.00	4.00	4.00	2.35
Skelp, sheared steel, P'gh.	6.00	6.00	6.00	2.45
Steel hoops, Pittsburgh..	5.75	5.75	5.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 5, 1917.	Aug. 29, 1917.	Aug. 8, 1917.	Sept. 6, 1916.
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	8.50	8.50	8.50	2.90
Sheets, galv., No. 28, P'gh	10.00	10.00	10.00	4.15
Wire nails, Pittsburgh...	4.00	4.00	4.00	2.60
Cut nails, Pittsburgh....	4.65	4.65	4.65	2.60
Fence wire, base, P'gh..	3.95	3.95	3.95	2.55
Barb wire, galv., P'gh...	4.85	4.85	4.85	3.45
Old Material,				
Per Gross Ton:				
Iron rails, Chicago.....	$44.50	$44.50	$40.50	$18.75
Iron rails, Philadelphia..	45.00	45.00	45.00	20.00
Carwheels, Chicago.....	31.50	31.50	30.50	11.50
Carwheels, Philadelphia..	34.00	34.00	35.00	16.50
Heavy steel scrap, P'gh..	34.00	34.00	33.00	16.00
Heavy steel scrap, Phila.	*31.00*	32.50	31.00	14.75
Heavy steel scrap, Ch'go.	31.00	31.00	29.00	15.75
No. 1 cast, Pittsburgh...	30.00	30.00	34.00	14.50
No. 1 cast, Philadelphia.	*32.00*	33 00	34.00	16.00
No. 1 cast, Ch'go (net ton)	24.00	24.00	23.00	12.00
No. 1 RR. wrot, Phila....	45.00	45.00	45.00	20.00
No. 1 RR. wrot, Ch'go (net)	**36.00**	34.00	33.50	16.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	$13.50	$12.00	$13.00	$3.00
Furnace coke, future....	10 00	10.00	10.00	2.50
Foundry coke, prompt...	**14.50**	13.50	14.00	3.50
Foundry coke, future....	12.50	12.50	10.00	3.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.	*25.25*	25.50	28 00	28.00
Electrolytic copper, N. Y.	*25.25*	25.50	28 00	28.00
Spelter, St. Louis.....	*8.00*	8.12½	8.50	8.50
Spelter, New York.....	*8.25*	8.37½	8.75	8.75
Lead, St. Louis.....	*10.12½*	10.42½	10.75	6.60
Lead, New York.....	*10.25*	10.55	10 87½	6.75
Tin, New York.....	*61.00*	61.50	63 62½	38.87½
Antimony (Asiatic), N. Y.	*14.50*	15 00	15.00	12.00
Tin plate, 100-lb. box, P'gh	**$12.00**	$11.00	$12.00	$5.75

$70 Pittsburgh, this being resale steel. From the highest point reached, this price shows a decline of $30 to $35 per ton in soft Bessemer and open hearth billets and sheet bars, which sold several months ago at $100 and even $105 at maker's mill. Prices on pig iron are holding fairly firm, and most of the resale Bessemer iron is under option, and likely to be applied on the recent inquiry from the Government for 40,000 tons of Bessemer iron for shipment to Italy. It is figured there will be a shortage in pig iron this winter and that prices may hold up to very near their present levels. The Government is still placing orders for all kinds of steel products, notably plates, sheets, spike rivets and other grades of finished materials. It has also been a frequent buyer of pig iron at somewhat lower prices than quoted to domestic consumers. It is believed that when the Government attitude as to steel prices is definitely known, there may be a general buying movement, as for more than a month consumers have not been buying a pound of material of any kind they could possibly do without. The market has held fairly steady during the almost practical suspension of new buying, and the mills still have orders on their books for the greater part of all the material they can turn out this year. W. P. Snyder & Co. report the average of Bessemer iron in August to have been $53.22 and of basic $49.42, both based on sales of 1000 tons or more in gross tons, f.o.b. Valley furnace. Compared with July, the average price on Bessemer iron shows a decline of $3.28 and on basic of $3.426. This is the first time in many months that average prices on Bessemer and basic iron as compiled by W. P. Snyder & Co. have shown a decline. Prices on both Bessemer and basic iron had shown an advance each month over the preceding month for several years.

Pig Iron.—The local pig iron market is extremely dull, there being no new inquiry, and no sales are being made. The only lot of Bessemer iron under negotiation is 5000 tons for shipment to Canada, on which $52 per gross ton at Valley furnace has been quoted, subject to ability of the seller to get license to ship on into Canada, which is regarded as being doubtful. On the recent inquiry for 40,000 tons of Bessemer iron for shipment to Italy, it is understood that about 25,000 tons has been gathered up in small lots from different furnaces, but as yet the remaining 15,000 tons has not been secured. The local pig iron market seems to be fairly strong, and while no new buying is going on, there is strong feeling that there will be this fall and winter a steady demand for all the Bessemer and basic iron that is turned out and that prices will rule high. One stack at Sharpsville, Pa., will likely go out this month for relining. There is no inquiry for malleable Bessemer or foundry iron, but furnaces report that consumers are taking in iron promptly, and the resale Bessemer and foundry iron seems to have been pretty well cleaned up.

We now quote as follows: Standard Bessemer iron, $50 to $52; basic, $48; No. 2 foundry, $52; malleable Bessemer, $52 to $53; and gray forge, $46 to $47, all at Valley furnace. The freight rate for delivery in the Pittsburgh and Cleveland districts from Valley furnaces is 95c. per ton.

Billets and Sheet Bars.—Offerings of billets, sheet bars and slabs for resale are still being made freely and, in fact, about all the semi-finished steel that has been sold in this market for some time has been resale steel. Buyers to whom it was shipped seem to be able to spare it and are trying to dispose of it in the open market. It is said that one mill that has sold considerable steel lately has offered for resale billets and slabs as low as $70 per ton, Pittsburgh. Steel mills which are shipping out steel on contracts are not sellers of steel on the open market, stating they need their entire supply for their regular customers who are taking in steel about as fast as it is being shipped. At the same time, it is a fact that about all the sales of

billets and sheet bars made in this market for some time have been resale steel, the steel producers holding aloof. While we do not quote soft Bessemer and open hearth billets below $75, it is a fact they have been offered as low as $70, but we are not advised as yet of any actual sales at that price.

We now quote soft Bessemer and open-hearth billets at $75, and soft Bessemer and open-hearth sheet bars at $80 or less, makers' mill, Pittsburgh or Youngstown. We quote forging billets at nominally $100 to $110 per ton for ordinary sizes and carbons, f.o.b. Pittsburgh.

Steel Rails.—Local mills are busy rolling standard sections and light rails to apply on Government contracts for shipment to France, these contracts taking preference over all other orders on the books of the mills. There is very little new domestic buying of either light rails or standard sections, but it is understood that the Carnegie Steel Co. and Cambria Steel Co. are sold up on all the light rails and standard sections the two concerns can turn out over the next year. Prices on new light rails and standard sections are given on page 565.

Ferroalloys.—The local market on ferroalloys of all kinds is very quiet, consumers evidently having their wants covered for some time ahead. There is a feeling, too, that probably prices on ferroalloys may be readjusted by the Government to a lower basis, and while consumers are taking in material promptly on contracts, they are not buying a pound of material on new orders they can possibly avoid. We quote 80 per cent domestic ferromanganese for prompt shipment at about $400, but on a firm offer this might be shaded. For first quarter of next year, $375 is quoted and for first half $350, but these prices are not very firm. We quote 18 to 22 per cent spiegeleisen at $70 to $75, delivered. Consumers of ferrosilicon and silvery iron are covered over the remainder of this year, and some for first half of 1918, and new buying is very quiet.

We quote 9 per cent Bessemer ferrosilicon at $89, 10 per cent $90, 11 per cent $95, 12 per cent $100, 13 per cent $105, 14 per cent $115, 15 per cent $125, and 16 per cent $135. We now quote 7 per cent silvery iron at $84 to $89. 8 per cent $85 to $90, 9 per cent $86 to $91, 10 per cent $87 to $92, 11 and 12 per cent $88 to $93. All f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having a uniform freight rate of $2 per gross ton for delivery in the Pittsburgh district.

Structural Material.—The local market is extremely dull, no contracts of moment having been placed here for some little time. Local fabricators say they are filled up for the remainder of this year, and are not actively bidding on new domestic work that is coming up, but are conserving a good part of their future output to meet expected demands of the Government. The American Bridge Co. is furnishing very large quantities of fabricated steel to the Government and also to the Federal Shipbuilding Co., for its new plant, also to Government cantonments and other war buildings, in which a good deal of structural steel is being used. We quote beams and channels up to 15 in. at 4c. to 4.50c., the lower price for delivery of last quarter, and the higher price for small lots for fairly prompt shipment.

Plates.—The Government embargo on plates destined to Japan has released considerable quantities of plates for domestic consumers, which mills are now offering for resale, and this has eased up the market to some extent for fairly prompt deliveries. One local mill has about closed for 26,000 tons of ship plates, to go into Government ships to be built on the Pacific Coast. The Carnegie Steel Co. is furnishing enormous quantities of plates to the Government, and also the Jones & Laughlin Steel Co. New inquiry for plate is not so active and domestic consumers are not having so much trouble as sometime ago in finding plates for fairly prompt delivery. We now have ¼ in. and heavier sheared plates at 8c. to 10c. at mill for delivery over the remainder of this year, while small lots bring 11c. to 12c. and higher from warehouse, prices depending upon the quantity and sizes.

Sheets.—The domestic demand for sheets is quiet, consumers buying only such quantities as their needs demand, believing that soon there will be a readjustment of prices to a lower basis. At the same time, it is true that four or five of the leading makers of sheets have their output sold up for this year, and are not actively quoting in the open market. The Government is still placing orders for sheets freely, mills having taken a contract recently for about 12,000 tons of galvanized sheets for prompt shipment. Prices on sheets to the domestic trade are not as firm as they were a month ago or six weeks ago, and sheets for fairly prompt shipment are easier to obtain. Prices on the different grades of sheets, which are none too strong, are given on page 565.

Tin Plate.—A very largely attended meeting of tin plate manufacturers was held in the William Penn Hotel, this city, on Friday, Aug. 31, to discuss matters that came up at the previous meeting of tin plate manufacturers held in Washington, D. C., on Friday, Aug. 24, on request of Food Administrator Hoover. Every tin plate maker of any prominence was represented at the Pittsburgh meeting, Aug. 31. E. T. Weir, president of the Phillips Sheet & Tin Plate Co., acted as chairman. The principal question discussed was the request made by Food Administrator Hoover that manufacturers agree to sell consumers of tin plate over the entire year of 1918, this to be regarded largely as a war measure, and to prevail only until the war ends. The manufacturers did not take kindly to this request, having only last year succeeded in putting the tin plate business on a basis of making contracts for only six months ahead. If the tin plate makers are to sell their product over all of 1918, they insist they must be covered with sheet bars for the entire year, and this matter of securing steel, and also to take up other questions, was put in the hands of a committee consisting of J. I. Andrews of the American Sheet & Tin Plate Co.; E. T. Weir of the Phillips Sheet & Tin Plate Co.; E. R. Crawford of the McKeesport Tin Plate Co., and Philips Schaefer of the Jones & Laughlin Steel Co., the last named being an added member. This committee, it is understood, will take up with the steel makers the matter of securing a supply of sheet bars over all of next year in case the tin plate makers agree to sell their product for that period. At the meeting in Washington, Food Administrator Hoover asked that no sales of tin plate for next year delivery be made prior to Oct. 1, and this was agreed to. The above named committee will gather as much information as soon as it can, and very shortly another meeting of tin plate makers will be held to discuss the important pending questions. Recently Food Administrator Hoover took over to his Food Administration Department the committee on conservation of tin plate. This committee consists of Henry Burden, president of the National Canners Association, who is chairman; Theodore F. Whitmarsh, president of the National Wholesale Grocers' Association; Dr. Carl Alsberg, of the Department of Agriculture; Henry W. Phelps, vice-president of the American Can Co.; Charles Bently, aide to Mr. Hoover of the food administration, and J. I. Andrews, general sales agent of the American Sheet & Tin Plate Co. Dr. E. E. Pratt resigned from this committee some time ago, and his place has not been filled. By reason of the action of Mr. Hoover in taking over this committee, Mr. Andrews and the others will be able to render the same efficient service as before, with complete immunity on account of other present business connections. Splendid service is being given the Government by all the tin plate makers in conserving their output to the manufacturers of bright plate for containers for perishable foods, and while there may be a shortage in supply it is believed the requirement of the country in bright plate for packing perishable foods will be well taken care of. It has been pointed out that very little increase in output of tin plate in 1918 over this year can be expected on account of the heavy draft of men for war service made on all the tin plate plants. It is even somewhat doubtful whether during the greater part of next year it may not be necessary to cut off one turn from operations on account of this shortage of labor. While tin plate was not mentioned in the recent embargo, it was probably meant to include it, and no doubt mills making foreign shipments of tin plate will be required very soon to secure Government permits. The export demand for tin plate is

still fairly heavy, but few sales have been made for some time. The current demand for small lots from stock is fairly active, and on primes mills are able to get anywhere from $12 to $15 per base box at mill. All the mills are now refusing to make sales of tin plate to jobbers, except where the latter can show that the tin plate is intended for packing perishable foods. Prices in effect on terne plate are given on page 565.

Iron and Steel Bars.—Mills report the new demand for iron and steel bars as only fairly active. Customers who are not covered on low priced contracts are not making any new purchases they can avoid, in the belief that prices on iron and steel bars will be on a lower basis in the near future. The Government is a very heavy consumer of steel bars at the price of 2.50c. agreed upon some months ago, and two of the local steel bar mills are making heavy shipments of steel bars to various plants making Government equipment. Implement makers and wagon builders are specifying freely against contracts. The demand for reinforcing steel bars is fairly heavy and prices are lower than for some time. Mill prices in carloads and larger lots on iron and steel bars on domestic orders are given on page 565.

Hoops and Bands.—Consumers are well covered over the remainder of this year, and new buying is light, being only for small lots for prompt shipment to cover current needs. Consumers believe prices will be lower soon, and will not buy any hoops or bands they can do without. We quote steel hoops in small lots for prompt shipment at 5c. to 5.50c. and bands 5c. to 5.25c. at mills. Extras on the latter as per the steel bar card.

Muck Bar.—The new demand is quiet and best grades of muck bar, made from all pig iron, are held at $85 to $90 per gross ton, Pittsburgh. Wages of puddlers for September and October will be 50c. per ton higher than in the two previous months.

Wire Rods.—The domestic demand is active, while the foreign inquiry is very heavy from Canada, England, the Orient and other countries. Recently a leading mill sold about 15,000 tons of soft open-hearth wire rods for shipment to Italy at $85 per gross ton at mill. Another mill took 4000 to 5000 tons of soft open-hearth rods for export shipment at $90 at mill. Small domestic sales of soft open-hearth Bessemer rods are being made at $90 to $95 at mill. Prices on rods are given in detail on page 565.

Wire Products.—The situation in the wire trade is unchanged. As yet none of the independent mills shows any inclination to reduce prices to the level of those of the American Steel & Wire Co., but it is certain that in the near future the independent mills will have to reduce prices or the leading interest will have to advance its price, but the latter is not likely. With its enormous capacity for output, the leading interest can come very close to taking care of the entire needs of the country in nails and wire, and for some time has been getting the bulk of the new business being placed. This condition will not be allowed to continue indefinitely. The new demand for wire and wire nails is quiet and specifications against contracts are dull. Jobbers say they cannot compete and pay $16 more per ton for nails and wire than their competitors are paying. However, very few wire nails and wire were sold at the $4 price for nails and $4.05 price for wire. Jobbers are inclined to keep stocks down as low as possible in view of the expected readjustment in prices on both nails and wire to a lower basis. Prices on nails and wire by the independent mills, which are largely nominal, prices of the American Steel & Wire Co., being $16 per ton lower, are given on page 565.

Shafting.—Several makers report that last week specifications on contracts for shafting for the automobile trade were larger than in any one week for some time. The Willys-Overland Co. specified recently for a large quantity of shafting and other automobile builders have done likewise. The Government is still the leading new buyer of shafting, taking from 35 to 40 per cent of the output on direct and indirect orders. One leading maker is just starting to take contracts for shafting for last quarter of the year delivery and reports having closed some contracts on the basis of 5 per cent off list. Discounts on shafting remain at 10 and 5 per cent off list, depending on the order.

Railroad Spikes and Track Bolts.—New buying by the railroads is reported dull and specifications on contracts for railroad spikes are not very active. The Government is still buying freely, and three local makers are running their plants largely on Government orders for quick shipment. The demand for boat spikes is very heavy, one leading maker conserving its entire output for the Government. Prices for railroad spikes and track bolts are firm and are given on page 565.

Nuts and Bolts.—The new demand is quiet, consumers evidently believing that prices are likely to be lower in the near future and are buying only such quantities of nuts and bolts as they absolutely need. Discounts now in effect by the large trade are given on page 565.

Cold Rolled Strip Steel.—The new demand is quiet and specifications against contracts are only fairly active. It is said that some consumers of cold-rolled strip steel have asked the mills to hold up shipments, at least in part, until the definite course to be taken on steel prices is more clearly defined. So far there have been very few cancellations on contracts and prices are reported as holding firm.

On contracts, mills are quoting 9c. at mill, but on small current orders prices range from 10c. up to 12c. at mill. Terms are 30 days, less 2 per cent off for cash in 10 days when sold in quantities of 300 lb. or more.

Rivets.—Local makers are working actively on heavy contracts for rivets placed recently by the Government for the first 500 ships to be built by the Emergency Fleet Corporation, which are to be delivered as promptly as the makers can turn them out. The domestic demand for rivets is dull, consumers believing that lower prices will come in the near future, and they are buying only such quantities as they must have for current work in their shops. We quote structural rivets at $5.25 and cone head boiler rivets at $5.35, per 100 lb. f.o.b. Pittsburgh, for delivery over the remainder of this year.

Wrought Pipe.—The domestic demand for both butt and lap weld iron and steel pipe has fallen off a good deal, but stocks held by jobbers are heavy, and mills are filled up for the remainder of this year on lap weld pipe, but are in position to make deliveries on butt weld pipe in eight to 10 weeks or less. No Government orders for steel pipe have lately been placed. There are numerous inquiries for line pipe for gas and oil projects, but pipe mills are filled up so far ahead that these inquiries are being turned down. Discounts on steel pipe being quoted by most of the independent mills are given on page 565. Prices quoted by the National Tube Co. to its trade are somewhat lower.

Boiler Tubes.—Makers of iron steel tubes are filled up for a year or more ahead, but a good part of their present output is being applied on Government orders which are being shipped as fast as the mills can turn the tubing out. Prices on oil country goods are ruling high, heavy premiums being paid where a mill or jobber is in position to make prompt delivery. Actual prices ruling for iron and steel tubes are very much higher than those given in the nominal discounts on page 865.

Coke.—The continued shortage in cars and also in labor is serving to keep up prices on high grade blast furnace coke for prompt shipment. Last week the car supply, based on actual output of coke, did not run more than 60 per cent, and the outlook for this week is no better. On Tuesday, Sept. 4, there were fairly large sales of high grade furnace coke for spot shipment at $13 and $13.50 per net ton at oven. One leading maker of high grade furnace coke that has been furnishing its coke to several consumers, on a day-to-day price, fixed the average price for the month of August at $13.50 per net ton at oven. We quote best grades of furnace coke for prompt shipment at $13 to $13.50 per net ton at oven and 72-hr. foundry coke at $14 to $14.50 per net ton at oven. *The Connellsville Courier* gives the output of coke in the upper and lower Connellsville regions for the week ending Aug. 25, as 358,504 tons, an increase over the previous week of 7550 tons. It is believed that within a week or 10 days the Government will name a price on furnace coke, which it is thought will not be above $5 per net ton at oven.

Old Material.—Following the recent purchases of heavy steel melting scrap, and also borings and turnings by the Carnegie Steel Co., the local scrap market has again quieted down and very little is doing. A local consumer recently closed for upward of 1500 tons of low phosphorus melting stock at prices ranging from $42 to $45 per gross ton, delivered, the higher price having been paid for billet and bloom ends and also for plate shearings. The railroad embargoes are still on, but dealers say they can get cars fairly promptly, if they can show that the parties to whom the scrap is to be shipped will take it in and unload the cars promptly. Leading consumers are not interested in the scrap market at present, and are evidently looking for lower prices. Dealers quote for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$34.00 to $35.00
No. 1 foundry cast	30.00 to 31.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	38.00 to 40.00
Hydraulic compressed sheet scrap	25.00 to 26.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mill, Pittsburgh district	23.00 to 24.00
Bundled sheet stamping scrap	21.00 to 22.00
No. 1 railroad malleable stock	26.00 to 27.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock	42.00 to 45.00
Iron car axles	45.00 to 46.00
Steel car axles	45.00 to 46 00
Locomotive axles, steel	52.00 to 53.00
No. 1 busheling scrap	24.00 to 25.00
Machine-shop turnings	21.00 to 22.00
Cast iron wheels	31.00 to 32.00
Rolled steel wheels	36.00 to 37.00
*Sheet bar crop ends	41.00 to 42.00
Cast iron borings	22.00 to 23 00
No. 1 railroad wrought scrap	32.00 to 33.00
Heavy steel axle turnings	23.00 to 24.00
Heavy braekable cast scrap	24.00 to 25.00

*Shipping point.

Chicago

CHICAGO, Sept. 4.

Plates within a limited range of sizes have sold at 8c., Pittsburgh, and jobbers have bought at 8.50c., Pittsburgh, although the business done at these prices is not large in the aggregate. The weakness indicated is attributed entirely to the embargo on exports. The Government continues the one big buyer with prices indeterminate, having placed in this territory about 10,000 tons of material for portable railway construction in France, about 1000 tons of rivet rods for navy yard delivery, shipbuilding material, etc. The order placed with the leading local independent mill for shipbuilding plates and shapes totals 18,000 tons, instead of 15,000, it having been determined to build the bulkheads and deckhouses of composite ships of steel instead of wood. In a general way, the entire steel trade is enveloped in a haze of uncertainty. Meanwhile Government orders upset rolling schedules. Consumers are drawing nearer the end of their material contracts and must soon replenish, but at what prices no one knows. Doubt on all sides is conducive to quiet and the only buying is that forced by urgent necessity. Business in pig iron is extremely quiet, likewise that in old material.

Ferroalloys.—No change is reported, the quotations for 80 per cent ferromanganese being $400 for delivery this year, $375 for the first quarter and $350 for the second quarter. For 10 per cent Bessemer ferrosilicon, $100, Jackson County, is asked. The market is quiet.

Pig Iron.—Except for an occasional transaction involving a carload or two, the market is inactive at unchanged prices. Northern makers ask $55, furnace, for No. 2 foundry, delivery up to next July. The Southern producers quote $50, furnace, or $54, Chicago, for this year, and $48 for next year for No. 2. Little of this year's product is unsold, where standard iron is concerned, but high and low grades are not so difficult to find. Silvery running 4 to 5 per cent silicon is quoted at $52, Birmingham. The lack of standard grades is due to the irregularity of furnace operations resultant from insufficient coke. Deliveries show little or no improvement. The only evidence of easier prices is the offering now and then of a car of resale iron, but there is not enough of this to have any effect on the general market, and producers' quotations are firm. Consumers are filled with doubt as to the future and inclined to wait. The price table is unchanged. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 1 to 4	$58.00
Lake Superior charcoal, Nos. 5 and 6, Scotch and No. 1 soft or special	60.50
Northern coke foundry, No. 1	55.50
Northern coke foundry, No. 2	55.00
Northern coke foundry, No. 3	54.50
Northern high-phosphorus foundry	55.00
Southern coke No. 1 f'dry and 1 soft	55.00
Southern coke No. 2 f'dry and 2 soft	54.00
Malleable Bessemer	55.00
Basic	55 00
Low-phosphorus	$90.00 to 93.00
Silvery, 8 per cent	82.75 to 83.00

Plates.—The strict embargo on the exporting of plates has had the expected effect, and the market is easier, although not all sellers are willing to leave the 10c. basis. In limited sizes, sales have been made at 8c., Pittsburgh, while jobbers have taken a broader range of sizes at 8.50c., Pittsburgh, all of the business, however, not being important. Consumers and not a few sellers regard 8c. as still too high to stir buyers to activity. The Government demand for ship plates is immense, despite the fact that its program is not under full headway so far as buying is concerned. For delivery out of their stocks, jobbers quote 10c.

Structural Material.—An Eastern producer adheres to 6c., Pittsburgh, for shapes, but the opinion is given by a Western maker that 4.50c., Pittsburgh, can be done for delivery this year. Some business is still being done for export but the new restrictions make the obtaining of licenses a long and uncertain task. No car orders are reported. The American Bridge Co. will supply 210 tons for the Waukegan plant of the American Steel & Wire Co. Unknown bidders will supply 125 tons to the Great Western Smelters' Corporation at Mayer, Ariz., and 128 tons for the American Smelting & Refining Co. at Durango, Col. The Minneapolis Steel & Machinery Co., Minneapolis, will supply 764 tons to the Utah Copper Co., Magna, Utah. The Illinois Steel Bridge Co. will supply 119 tons to Spokane County, Washington, for bridge spans, and Dyer Brothers will supply 200 tons for the Y. M. C. A. building at San Francisco. Jobbers continue to quote 5c.

Bars.—For delivery this year, steel bars are quoted at 4.50c., Pittsburgh. Business is not active, but it is felt that something must be done in the near future for the agricultural implement makers and other consumers. As said heretofore, assurance as to future stability of prices is the lacking factor. For rail carbon or concrete reinforcing bars, demand is somewhat more active with quotations ranging from 4.25c. to 4.50c., Chicago. Iron bars are unchanged at 4.50c. to 5c. Chicago. Jobbers' prices are unchanged.

Wire Products.—Jobbers have been buying and the stocks of some are well replenished. Otherwise the only news is that poultry netting is now sold on a new basis. Instead of list prices for square feet, there are now lists for bales at 150 linear feet. All quotations are unchanged, the independents still quoting 4c. for nails.

Sheets.—A tendency toward more reasonable prices is shown. Both No. 28 black sheets and No. 10. blue annealed range from 8.75c. to 9c., Pittsburgh, although one or two makers ask over 9c. for blue annealed. Galvanized is a little easier at 10.50c., Pittsburgh. Sheets are still being exported to the far East, especially Japan. Jobbers' prices are unchanged.

Cast Iron Pipe—No municipal lettings or inquiries can be reported. The jobbing demand is holding up reasonably well. Prices are without change.

Rails and Track Supplies.—The Government continues active in placing light rails and track supplies for the construction of portable railroads in France, about 10,000 tons having been placed in this territory in the past week. It is estimated that at least 30,000 tons was placed altogether. The domestic railroads are

doing much patching where they ordinarily would be laying new track. They are getting deliveries from the leading interest where failure to supply them would entail dangerous conditions. Prices are unchanged.

Bolts and Nuts.—Prices and conditions are unchanged. For prices and freight rates, see finished iron and steel, Pittsburgh, page 565.

Old Material.—The market is irregular, with buying confined to odd lots for which needy consumers have paid premiums. Such sales, however, are not numerous enough to establish the market. Users of scrap are actuated by uncertainty over probable governmental influence on prices as much as are any others. In the absence of general buying, quotations are dependent on individual requirements, with consequent lack of uniformity in prices. The Northwestern Railroad has issued a list of several thousand tons, and smaller lists have come from the Soo Lines, Pennsylvania Lines West, Chicago & Great Western and the Erie. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$44.50 to $45.00
Relaying rails	50.00 to 55.00
Old carwheels	31.50 to 32.50
Old steel rails, rerolling	40.00 to 41.00
Old steel rails, less than 3 ft.	40.00 to 41.00
Heavy melting steel scrap	31.00 to 32.00
Frogs, switches and guards, cut apart	31.00 to 32.00
Shoveling steel	30.00 to 31.00
Steel axle turnings	22.00 to 23.00

Per Net Ton

Iron angles and splice bars	$40.00 to $41.00
Iron arch bars and transoms	43.00 to 44.00
Steel angle bars	35.00 to 36.00
Iron car axles	41.00 to 42.00
Steel car axles	41.00 to 42.00
No. 1 railroad wrought	36.00 to 37.00
No. 2 railroad wrought	33.00 to 34.00
Cut forge	32.00 to 33.00
Pipes and flues	22.50 to 23.50
No. 1 busheling	25.50 to 26.50
No. 2 busheling	17.50 to 18.50
Steel knuckles and couplers	37.00 to 38.00
Steel springs	37.00 to 39.00
No. 1 boilers, cut to sheets and rings	20.00 to 21.00
Boiler punchings	35.00 to 36.00
Locomotive tires, smooth	40.00 to 41.00
Machine-shop turnings	17.00 to 18.00
Cast borings	16.00 to 17.00
No. 1 cast scrap	24.00 to 25.00
Stove plate and light cast scrap	17.50 to 18.00
Grate bars	17.50 to 18.50
Brake shoes	19.00 to 19.50
Railroad malleable	31.50 to 32.50
Agricultural malleable	24.75 to 25.75
Country mixed scrap	18.00 to 19.00

Philadelphia

PHILADELPHIA, Sept. 4.

August was a dull month, fewer orders being recorded in all lines than in any preceding month for some time. There is a belief that considerable business will be placed as soon as the Government price-fixing program is determined, but until then conditions must remain very much as they have been reported for several weeks past. The question of what quantities of steel the Government will require is just as disturbing to future business as price-fixing as steel mills are unable to name definite dates of delivery until the Government makes its wants fully known. This will hold back some business even after the price question is settled. For example, there are building projects in contemplation that would soon be settled if it were possible for the mills to promise fixed dates of delivery for the structural steel. Efforts have been made to ascertain from the Emergency Fleet Corporation just what requisitions for plates and shapes will be made during the coming year, but apparently the officials of that organization are still lacking in positive knowledge of their future requirements. Specifications are coming to the mills regularly in tonnages about equal to present output. The pig-iron market is almost featureless and transactions are few and small.

Pig Iron.—A number of small tonnages were sold during the week. August was extremely dull and September started out without promise of immediate betterment. The only sales of importance have been 500 tons of Virginia No. 2 X foundry at $51, furnace, and 1000 tons of standard low phosphorus iron at $90. New inquiries are light, the Southern Railway Co. having sent out the only one of any moment, that being for four different lots of foundry iron aggregating about 400 tons. This iron is for the Lenoir Car Works, which was reported a week ago as inquiring for 6000 tons. The Italian Commission, through a committee of the American Iron and Steel Institute in Washington, has been endeavoring to obtain several thousand tons of 0.05 low phosphorus iron, but apparently without success so far. This inquiry at first called for Bessemer iron, but was changed later to the low phosphorus grade. Two of the three furnaces making copper-bearing low phosphorus iron in this district will be blown out soon. None of this iron is being offered for delivery this year, and prices for the first half of 1918 are quoted at $80 to $85, furnace. Prices remain largely nominal on the following standard brands, prompt delivery in buyers' yards:

Eastern Penna. No. 2 X foundry	$53.00 to $55.00
Eastern Penna. No. 2 plain	52.50 to 54.50
Virginia No. 2 X foundry	53.75 to 54.75
Virginia No. 2 plain	53.25 to 54.25
Basic	50.00 to 52.00
Standard low phosphorus	90.00

Coke.—A sale of two cars of Connellsville foundry coke at $13 was made last week. Some handlers are asking up to $14.50 at oven for prompt shipment.

Billets.—Billets are weaker. Sales of open hearth re-rolling billets have been made during the past week at $100, while occasionally $90 is heard. Forging billets range from $115 to $125. Little business is being done and buyers will undoubtedly not take much interest until the price question is settled by the Government.

Sheets.—Quotations on sheets continue as follows: No. 10 blue annealed, 8.50c.; No. 28 black, 8.50c. to 9c., and No. 28 galvanized, 10.50c. to 11c., Pittsburgh. A Middle West mill is accepting orders at these prices for delivery within four to six weeks.

Structural Material.—Architects are making inquiries to "feel out" the situation in structural material, and it is considered likely that new building projects will be launched as soon as the Government has made known its total requirements in such form as to make it possible for mills to quote definite deliveries to private consumers. Under present conditions no one is courageous enough to engage in building operations which would necessarily drag along indefinitely because of uncertain delivery of material. It looks now as if the Philadelphia subway contracts would go through, and the steel for this work, involving more than 20,000 tons, will probably soon be placed. Prices on the small lots which are being sold range from 5c. to 6c., Pittsburgh.

Plates.—Mills are receiving specifications regularly from the Government and from private consumers who hold contracts. It is estimated that the tonnage covered by these is about equal to the output of the mills. On pending inquiries the price generally quoted is 10.185c., base, Philadelphia, in carloads, on tank steel, with the usual extras for higher grades. An agreement is made with each buyer that shipment in the time specified depends on the requirements of the Government. Producers are little disturbed by reports from other markets of prices as low as 8c. on plates, and continue strong in their views. A firm offer of 8c. for a good sized order might find takers in this market, but as there has been no one to try the experiment the price remains nominally at 10c., Pittsburgh. Re-sale lots possibly have been sold at 8c., but as these are for small tonnages they cannot be taken as an indication of any marked weakness. No large lots of boat steel have been sold during the week. The nominal price is 12.50c., Pittsburgh.

Iron and Steel Bars.—Specifications continue at a good rate on steel bars, but new business is scarce. The price generally asked is 4.50c., Pittsburgh, though some ideas as to price are as high as 5c. and 5.50c. It is intimated that a few small lots have been sold as low as 4.25c. Not enough business is being done to fix prices very definitely. Bar iron is firm at 5c., with one producer still offering at 4.75c., but with deliveries so far off that they do not interest the average buyer.

Ferroalloys.—Ferromanganese is stronger, though

without change of price, which is $400 for delivery over the remainder of this year, $375 for first quarter of next year and $350 for second quarter. Supplies are fairly plentiful at the present time, with no immediate danger of scarcity. Looking farther into the future producers view with some apprehension the withdrawal of steamers from Brazilian routes for transport service and also point to scarcity of labor and equipment at the Brazilian mines. In view of figures on imports of manganese ore, published on page 514 of the Aug. 30 issue of THE IRON AGE, showing a great increase for the first six months of the year compared with the same period last year, this apprehension need not be shared by buyers, at least for the present. Spiegeleisen is holding at $85, furnace, as reported last week.

Old Material.—The holiday period and a general absence of buying interest combined to make the past week one of the dullest on record this year. A couple of sales of about 200 tons each were the only events of the week, and these would not under normal conditions be worth reporting. Recent activity in No. 1 heavy melting steel was short-lived, and the price has now receded to $31 to $32. Other slight downward revisions of price are made this week, notably on No. 1 cast, which is $1 lower. In spite of the lack of business and generally adverse conditions, especially the railroad embargo, the market is holding up fairly well. Dealers are obtaining licenses for shipments, but the many restrictions make transactions exceedingly difficult and the speculative factor is being largely eliminated. Prices per gross ton delivered in the Pennsylvania district are about as follows:

No. 1 heavy melting steel	$31.00 to $32.00
Steel rails, rerolling	43.00 to 45.00
Low phosphorus heavy melting	40.00 to 43.00
Old iron rails	45.00 to 47.50
Old carwheels	34.00 to 35.00
No. 1 railroad wrought	45.00 to 47.50
No. 1 forge fire	22.00 to 23.00
Bundled sheets	22.00 to 23.00
No. 2 busheling	16.00 to 17.00
Machine shop turnings (for blast furnace use)	18.00 to 20.00
Machine shop turnings (for rolling mill use)	21.50 to 22.50
Cast borings (for blast furnace use)	19.00 to 20.00
Cast borings (clean)	22.00 to 23.00
No. 1 cast	32.00 to 33.00
Grate bars	21.00 to 22.00
Stove plate	21.00 to 22.00
Railroad malleable	32.50 to 35.00
Wrought iron and soft steel pipe (new specifications)	29.00 to 31.00
Pipes and tubes (wrought iron and soft steel)	31.00 to 32.00

Cleveland

CLEVELAND, Sept. 4.

Iron Ore.—Shipments in August amounted to 10,146,786 gross tons as compared with 10,241,603 tons in July and with 9,850,140 tons in August, 1916. Total Lake shipments for the season to Sept 1 were 36,523,554 tons as compared with 39,215,864 tons for the same period a year ago. Although a gain of approximately 300,000 tons was made in the August shipments, the total this year is 2,692,310 tons behind that up to the same date a year ago. It is doubtful whether there will be sufficient increase in the shipments during the remainder of the season to make up for the loss caused during the early part of the season by the late opening of navigation. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, $5.95; Mesaba Bessemer, $5.70; old range non-Bessemer, $5.20; Mesaba non-Bessemer, $5.05.

Coke.—There is a slight improvement in the demand for prompt shipment foundry coke and a few small lot sales are reported at $13.25 per net ton at oven for standard Connellsville makes. Producers are asking around $10 for contracts for the first half of next year.

Pig Iron.—The market is inactive and prices on foundry grades are slightly easier. We note the sale of 600 tons of high sulphur basic iron at $45, but no other sales of steel making iron or new inquiries are reported since prices were established at lower levels by recent sales in the Pittsburgh territory. The only demand for foundry iron is in small lots for early shipment, but no Cleveland made iron is available for this year's delivery. Virginia foundry iron has declined $1 per ton in several sales, ranging from car lots to 200 tons, made at $50, furnace, or $53.20, delivered, Cleveland. Valley quotations on foundry iron range from $52 to $54. Some resale Southern iron is being offered at $48, Birmingham, for No. 2 for early shipment. Ohio silvery is slightly easier. We quote, delivered, Cleveland, as follows:

Bessemer	$50.95 to $51.95
Basic	48.95
Northern No. 2 foundry	52.95 to 53.95
Southern No. 2 foundry	51.00 to 54.00
Gray forge	48.95 to 50.95
Ohio silvery, 8 per cent silicon	86.62 to 88.62
Standard low phos. Valley furnace	85.00

Finished Iron and Steel.—Buyers are withholding orders as much as possible until Government prices are fixed and are buying only to supply their immediate needs. Consumers and jobbers are reducing stocks because of the expectation of lower prices, and the bulk of the new business is for Government work. Plates rolled for export but not shipped because of the embargo are being offered at 8.50c., Pittsburgh, and some resale boiler plates are offered by purchasers at 9.50c., but local mills continue to quote 10c. for early shipment. Mills that have 10c. plate contracts complain that they are not getting specifications. Warehouse prices have eased off somewhat, jobbers who have been quoting the maximum prices having reduced these prices in some cases. Some new inquiry for sheet bar and billet contracts has come out, but quotations made by a local mill are considerably higher than the ruling prices. Bar iron is unchanged at 4.50c. Sheet prices remain at 8.50c. to 9c. for No. 28 black and No. 10 blue annealed and 10.50c. for No. 28 galvanized. Warehouse prices are 4.50c. to 5c. for steel bars and 5c. to 5.25c. for structural material.

Old Material.—The market is only moderately active. A fair volume of sales were made in the week, but mostly in small lots. A Cleveland mill has taken 2000 tons of heavy melting steel scrap at a reported price of $34.50 to $35. This grade is slightly easier and some transactions have been made between dealers at $34. Dealers claim that mills are getting their stocks well cleaned up and will have to come in the market for round lots soon, and they are inclined to hold firmly to prices, believing that the mills will soon have to pay somewhat better prices than they are willing to pay at the present time. The demand for cast scrap has improved and sales are being made at $27 and slightly higher. Busheling is inactive. Dealers are asking $27 to $28 for this grade, and the best price reported offered by a mill is $26. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$32.00 to $33.00
Steel rails, rerolling	44.50 to 45.50
Steel rails, under 3 ft	37.00 to 38.00
Iron rails	42.50 to 43.50
Steel car axles	26.00 to 26.50
Heavy melting steel	34.00 to 35.00
Carwheels	30.50 to 31.50
Relaying rails, 50 lb. and over	49.50 to 54.50
Agricultural malleable	23.50 to 24.50
Railroad malleable	32.00 to 33.00
Light bundled sheet scrap	23.50 to 24.50

Per Net Ton

Iron car axles	$46.50 to $47.00
Cast borings	18.00 to 18.50
Iron and steel turnings and drillings	17.50 to 18.00
No. 1 busheling	27.00 to 28.00
No. 1 railroad wrought	40.50 to 41.50
No. 1 cast	27.00 to 28.00
Railroad grate bars	21.00 to 22.00
Stove plate	20.50 to 21.50

Bolts, Nuts and Rivets.—Bolt and nut specifications are coming out in good volume, but new business is only moderate. Bids were received this week by the Navy Department for about 4000 tons of rivets. While it is stated that no definite understanding has been reached as to prices, makers are assured that prices will be satisfactory although quotations are subject to revision later. We quote rivets at 5.25c., Pittsburgh, for structural and 5.35c. for boiler rivets. Bolt and nut discounts are as follows, round lot buyers being allowed 5 to 10 per cent discount from these prices:

Common carriage bolts, ¾ x 6 in., smaller or shorter, rolled thread, 35 off; cut thread, 30 and 5, larger or longer, 20. Machine bolts, with h. p. nuts, ⅝ x 4 in., smaller or shorter, rolled thread, 40; cut thread, 35; larger and longer,

25. Lag bolts, cone point, 40. Square h. p. nuts, blank, $1.90 off list; tapped, $1.70 off list. Hexagon, h. p. nuts, blank, $1.70 off; tapped, $1.50 off. C. p. c. and t. hexagon nuts, all sizes, blank, $1.25 off; tapped, $1 off. Cold pressed semi-finished hexagon nuts, 50 and 5 off.

Cincinnati

CINCINNATI, Sept. 4—(*By Wire*).

Pig Iron.—The market has made no move in the past few days that would indicate anything certain as to any impending change in prices. The limited inquiry for first half shipment is not taken as a serious indication on the part of melters to cover for that period. Iron sold now is to the foundries and is for shipment this year. The minimum of $47, Birmingham basis, is not being shaded by the furnaces, and holders of resale iron are a little more firm in quoting this week. High silicon irons are wanted more than any other kind, and a few small sales of Southern foundry running around 4 per cent in silicon have brought over $51, Birmingham. There does not seem to be any call at all for gray forge and other low grades, although the small orders for prompt iron now placed include a fair percentage of No. 3 foundry. Northern iron is getting scarcer and deliveries are running behind on many urgent contracts, due principally to the curtailed production in the Ironton district. No. 2 foundry is unchanged at $55, Ironton, for this year, with no authentic quotations out for the first half of next year. It is generally understood that a great deal of foundry iron business is being accumulated and that when any degree of certainty exists as to approximate prices for the future, the buying movement will be one of large volume. Basic and malleable iron melters are in better shape as to the future, but the same condition to a certain degree exists with them. Ohio silvery irons are quoted around $80, furnace, for an 8 per cent analysis and a few carloads are being sold at this figure. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$51.40 to $52.40
Southern coke, No. 2 f'dry and 2 soft.	49.90 to 50.90
Southern coke, No. 3 foundry	49.40 to 50.40
Southern coke, No. 4 foundry	48.90 to 49.90
Southern gray forge	48.90 to 49.90
Ohio silvery, 8 per cent silicon	87.26 to 91.26
Southern Ohio coke, No. 1	56.26 to 57.26
Southern Ohio coke, No. 2	56.26 to 57.26
Southern Ohio coke, No. 3	55.26 to 56.26
Southern Ohio malleable Bessemer	56.26 to 57.26
Basic, Northern	56.26 to 57.26
Lake Superior charcoal	56.75 to 57.75

(*By Mail*)

Coke.—Spot foundry coke prices are easing down, but have not yet reached the level of contract quotations. For instance, Connellsville 72-hr. coke is bringing from $13 to $14 for prompt shipment, but can be bought for future delivery at $12 to $13. Wise County and Pocahontas prices are on the same level, but the supply of spot foundry coke in those districts is limited. New River operators are able to hold out for higher prices and spot foundry coke is quoted around $15, while contract business is being taken at $14 to $15 per net ton at oven. Business in all districts is light, and the amount of furnace coke changing hands is almost negligible. Furnace coke contract prices in the Connellsville field are from $9 to $10 at oven.

Finished Material.—Business is slowing down perceptibly, especially as far as structural shapes are concerned. However, the warehouses report a fair demand for reinforcing concrete rods, most of the orders being placed by contractors to finish jobs already under way. Iron and steel bars are quoted at 5c. from stock, and twisted steel bars at 5.05c. Plates, ¼-in. and heavier remain at 10c. and No. 10 blue annealed sheets at 10c. base. The mill price on No. 28 black sheets is unchanged at 8.65c. and on No. 28 galvanized 10.65c. f.o.b., Cincinnati or Newport, Ky. Orders are being booked daily on this basis, but the nearby mills have few sheets to offer outside customers, and are still devoting every effort to take care of old customers. The warehouse price of wire nails is $3.90 and on barb wire 5c. a lb. Very little business is reported. Mill supply houses report a little improvement for the latter part of last week, but on account of the holiday, they do not expect the present week's business to come up to the general average generally maintained during the past ten weeks, or more.

Old Material.—Transactions of every character are few and cover only very limited tonnages of any kind of scrap material. Prices are unsteady and have a downward tendency, although no changes have been reported. Offerings are light and dealers are indifferent about adding to their stocks at the present time. The following are dealers' prices f.o.b. at yards Cincinnati, and Southern Ohio:

Per Gross Ton	
Bundled sheet scrap	$20.00 to $20.50
Old iron rails	34.00 to 34.50
Relaying rails, 50 lb. and up	45.50 to 46.00
Rerolling steel rails	37.00 to 37.50
Heavy melting steel scrap	33.00 to 33.50
Steel rails for melting	33.00 to 33.50
Old carwheels	30.00 to 30.50
Per Net Ton	
No. 1 railroad wrought	$32.00 to $32.50
Cast borings	13.50 to 14.00
Steel turnings	13.50 to 14.00
Railroad cast	22.00 to 22.50
No. 1 machinery cast	24.50 to 25.00
Burnt scrap	14.50 to 15.00
Iron axles	44.00 to 44.50
Locomotive tires (smooth inside)	37.00 to 37.50
Pipes and flues	18.00 to 18.50
Malleable cast	24.50 to 25.00
Railroad tank and sheet	16.00 to 16.50

Birmingham

BIRMINGHAM, ALA., Sept. 5—(*By Wire*).

The furnaces are maintaining $50 on No. 2 foundry and basic for this year's delivery and $48 for next year. Uncertainty in the coal mining district is causing apprehension in iron making and foundry circles. Iron sales are few and light.

(*By Mail*)

Southern pig iron manufacturers apparently are still more interested in what the Government control policy will amount to than in anything else. The strength of the market is noticed but little, and while only a few sales of iron are being recorded, the prices have not changed any, $50 being asked for No. 2 foundry and basic for this year's delivery and $48 for next year's. Order books are so well supplied that it will be necessary to keep the production at maximum. Some hesitancy is noted in the make in this State by reason of unsteadiness in raw material supplies. Inquiries are in for small amounts of iron and consumers are still urging delivery. Railroad facilities are sufficient to meet some of these demands, but there is complaint on the part of consumers of delay. Further reduction of accumulated stocks of iron is noted in this section. The make can be increased at once, the Trussville furnace of the Birmingham Trussville Iron Co. being ready for the torch, but because of the uncertainty in the coal mining district here again, no attempt will be made to start for a while. This furnace will have a daily capacity of more than 200 tons. No verification of resale iron in quantity is to be given in this territory, but reports of some resales are still to be heard. Prompt delivery prices obtain in the South as follows:

No. 1 foundry and soft	$48.50 to $50.00
No. 2 foundry and soft	48.00 to 50.00
No. 3 foundry	47.50 to 48.00
No. 4 foundry	47.00 to 47.50
Gray forge	46.00 to 46.50
Basic	48.00 to 50.00
Charcoal	55.00 to 60.00

Coal and Coke.—There is so much unrest in the coal mining district around Birmingham since the suggestions of an agreement between the operators and union miners by Secretary of Labor Wilson were adopted by officials of the two sides that the production of coal has been materially affected. A convention of the union has been called for Wednesday of this week and there is much doubt whether the action of the officials will be ratified. In the meantime, mines are idle in various parts of the district and hundreds of men are not working. The idea of a strike is rampant throughout the district again and there is no telling what will happen. As a consequence of the curtailment of coal production, the coke make has been reduced some and this is being felt seriously.

Foundries and Machine Shops.—There is continued activity at the cast-iron pipe plants in the Birmingham district, with several small orders from municipalities

again reported. Prices range between $60 and $63, from the 4-in. pipe up. Commercial foundries have much work in hand, no mean part of it being Government contracts with but little being said of the nature of the work. The melt of pig iron and steel in this section has increased greatly in the past few months.

Old Material.—A slight improvement in the old material market is noted in the Birmingham district. Heavy melting steel is selling again above $20.25 and some of the larger consumers are asking for delivery on contracts. Dealers in scrap have yards well stocked and are able to meet all demands. A carload of brass scrap was shipped the past week from this section into the Cleveland territory, a high price being obtained, around 23c. Difficulty in getting cars prevents any business with other districts. Inquiry has been received here as No. 1 cast machinery, a difference in grading, in comparison with Philadelphia, being noted. In this section agricultural machinery is included, hence a difference in the quotations. Quotations are as follows:

Old steel axles	$32.00 to $33.00
Old steel rails	24.00 to 25.00
No. 1 wrought	26.00 to 27.00
Heavy melting steel	20.00 to 20.50
No. 1 machinery	24.00 to 25.00
Car wheels	23.00 to 24.00
Tramcar wheels	20.00 to 21.00
Stove plate	17.00 to 18.00
Shop turnings	11.00 to 12.00

St. Louis

ST. LOUIS, Sept. 4.

Pig Iron.—The call for pig iron has shown its greatest activity during the past week in a demand for immediate or near-by delivery or for special analyses, all, however, in small lots, the largest sale for the week not being over 100 tons and the aggregate probably not in excess of 1500 tons. There has been some selling of pig iron not coming up to grade specifications, as, for instance, some lots of malleable high in sulphur, etc. Even this latter has commanded firm prices and the melters have seemed willing to pay for material whatever has been asked within reason, provided deliveries could be made. Evidence is accumulating that more pig iron has been melted than the foundrymen expected, and there is every reason to believe that with a settlement of the uncertainty as to prices, some considerable buying for forward deliveries would be made a feature of the market here. The sales of No. 2 Southern foundry made during the week included some small lots for immediate shipment at $48 Birmingham, while the high sulphur malleable referred to brought about $51 per ton. No. 2X Chicago and No. 2 Northern, Ironton basis, are held at $55, but with no transactions of consequence. Melters are becoming very much more urgent as to the pig iron they have under contract and are pressing furnace representatives hard for their iron.

Coke.—Sales of coke have been made during the past week at $14 for best selected 72-hour, Connellsville basis, but no large contracts have been made either for immediate or future delivery, while contracts in effect have been the subject of very active pressure on the part of melters. By-product coke has not been at all active either as to local supply or near-by ovens. The local plant is covered by extended contracts ahead and therefore does not figure in the market.

Finished Iron and Steel.—Finished products have been quiet save for the pressure to obtain material which has been contracted for, and mill representatives have been unable to satisfy customers with the deliveries given or promised. We quote for material out of warehouse as follows: Soft steel bars, 4.55c.; iron bars, 4.50c.; structural material, 5.05c.; tank plates, 10.05c.; No. 10 blue annealed sheets, 10.50c.; No. 28 black sheets, cold rolled, one pass, 10.35c.; No. 28 galvanized sheets, black sheet gage, 11.75c.

Old Material.—The scrap market has shown no decided increase in activity, though there has been some buying by dealers to meet delivery requirements on contracts existing before the present inactivity of the market developed. Not enough buying, however, has been done to establish any prices very definitely and quotations continue to be estimates of value rather than anything else. Evidence is accumulating that consumers who have been operating steadily are approaching a period of need of additional material in order to keep up their pace, for their yards supplies and contracts for deliveries are becoming depleted seriously. No lists have appeared for the month's opening, due to the interference of the holiday. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$39.00 to	$39.50
Old steel rails, re-rolling	37.50 to	38.00
Old steel rails, less than 3 ft.	37.00 to	38.00
Relaying rails, standard section, subject to inspection	50.00 to	55.00
Old car wheels	28.00 to	28.50
No. 1 railroad heavy melting steel scrap	29.00 to	30.00
Heavy shoveling steel	27.00 to	27.50
Ordinary shoveling steel	26.00 to	26.50
Frogs, switches and guards cut apart	29.00 to	30.00
Ordinary bundled sheet scrap	18.50 to	19.00
Heavy axle and tire turnings	20.00 to	21.00
	Per Net Ton	
Iron angle bars	$36.50 to	$37.50
Steel angle bars	29.00 to	30.00
Iron car axles	39.00 to	40.00
Steel car axles	39.00 to	40.00
Wrought arch bars and transoms	39.00 to	39.50
No. 1 railroad wrought	33.00 to	33.50
No. 2 railroad wrought	30.00 to	30.50
Railroad springs	30.00 to	30.50
Steel couplers and knuckles	39.50 to	40.50
Locomotive tires 42 in. and over, smooth inside	38.50 to	39.50
No. 1 dealers' forge	24.00 to	24.50
Cast-iron borings	15.00 to	15.50
No. 1 busheling	24.00 to	24.50
No. 1 boilers, cut to sheets and rings	19.50 to	20.50
No. 1 railroad cast scrap	22.50 to	23.50
Stove plate and light cast scrap	16.50 to	17.00
Railroad malleable	29.00 to	30.00
Agricultural malleable	22.00 to	22.50
Pipes and flues	19.50 to	20.00
Heavy railroad sheet and tank scrap	18.00 to	18.50
Railroad grate bars	16.50 to	17.00
Machine shop turnings	15.00 to	15.50
Country mixed scrap	14.50 to	15.00

San Francisco

SAN FRANCISCO, Sept. 1.

More difficulties are being experienced in obtaining supplies of materials from Eastern mills than was the case earlier in the month. Local mills find nearly all their capacity engaged in filling Government orders, and frankly state their inability to attend to other requirements not already contracted for. Generally, buyers are not displaying eagerness in placing orders, either in this market or in the East. They seem indifferent and inclined to hold off, sensing a strong possibility that there will be Government regulation of the iron and steel industries, with a consequent impairment of prices. Some of the trade here are of the opinion that the outcome will be scarcer material and easier prices. Excepting the shipyards and urgent necessities of the Government, the demand from the oil fields provides the only active phase of this market. Much depends on the Government's interpretation of the embargo proclamation, and the result of negotiations between the Japanese commissioners and our Federal authorities at Washington.

Bars.—Local mills quote steel bars at a 5.60c. base, but their quotations are merely perfunctory, as the only orders taken are those applying on contracts. Jobbers quote, out of stock, coast sizes, at a base price of 6.50c. The former heavy demand for reinforcing bars has not kept pace with the advancing season.

Structural Materials.—There is not much activity in erecting new buildings at present, and demand for structural material of all kinds is sagging. There is, however, a large bascule bridge authorized to be built, at a cost of $1,800,000, across the Oakland harbor, which will require a considerable quantity of structural steel. Jobbers' quotations, out of stock, are given at 7.75c., which shows an advance in the last two weeks, although there is a weakened demand.

Plates.—All stocks of tank plates held by local jobbers are very much depleted by the heavy shipments to Japan before the embargo took effect. Every plate

visible in this market, regardless of size, was eagerly bought up by Japanese agents. Tank plates, ¼ in. or over, are quoted at a base price of 10.50c., with no guarantee of delivery. The sparse supplies of plates received by the shipbuilding plants on this coast are a source of anxiety to them, and promised relief at the hands of the Government is hoped to develop shortly.

Sheets.—The bareness of the market here has induced small advances on certain sizes; others remaining without change. Jobbers are quoting, net for cash, blue annealed sheets No. 10 at a base price of 11.10c., black No. 28 at 11.28c. and galvanized No. 28 at 13.03c. Demand in this market continues very insistent, and it has been difficult to satisfy customers. During the last two weeks there have been received telegraphic offerings of odd lots of sheets, small in quantity, running from 100 to 200 tons each. This shows that some mills have a little surplus to dispose of at prevailing prices. It may prove an indication of some easing of the situation that has oppressed this market for several months.

Wrought Pipe.—Owing to the more lenient view taken by the Government, lately, of the oil producers' claims, and the patent fact that remedial measures must be taken immediately, to provide against a most serious oil shortage, great activity is pending in the oil fields of California. Orders for pipe are being received at the mills in such quantities that they are unable to take care of them. Some mills have orders for a year ahead. Black ¾-in. pipe is quoted at a base price of $8 60 per 100 ft.; ¾-in. galvanized, $11.00; 1½-in. black pipe, $20.55; 1½-in. galvanized, $26.30.

Cast Iron Pipe.—Tonnage has been light for some time, and at the present there is little business offering. There are a few scattering orders for light pipe, but no municipal contracts are in sight, and there seems to be a general slacking up in corporation work, involving the use of cast iron pipe.

Pig Iron.—Export demand is steady and orders are of large tonnage. Owing to the uncertainty of Government action, it has been impossible to fill them. Some dealers have applied for export licenses but are without response from Washington. The local situation is quiet, as nearly all consumers have their requirements already covered. No weakening in prices of pig iron may be expected, as a year's business is booked at nearly all the furnaces.

Coke.—Coke is still very scarce and hard to obtain, with $23.00 asked. Demand is very steady and some buyers desire to make contracts for the first half of 1918. Their suggestions do not meet with response from producers, who are not willing to book so far ahead without definite knowledge of tonnage offered.

Old Materials.—The market on old materials has again stiffened. Holders have recovered from their trepidation over the embargo on shipments to the Orient, finding that domestic needs are sufficient to absorb stocks. Good country scrap is now quotable at $25, and old rails at $29. The hulk of the wrecked steamer Progreso, which has been lying on the mudflats for years, is being broken up for scrap. It is confirmed that a large quantity of old material is lying at Seattle awaiting a chance for shipment to Japan. If no export license can be obtained this lot will be available for the domestic market.

British Steel Market

Export Pig-Iron Price Fixed for the Allies—Business in Ferromanganese Difficult

(*By Cable*)

LONDON, ENGLAND, Sept. 5.

Cleveland pig iron is more active and the demand for hematite iron exceeds the supply. The export price for the Allies, f.o.b. East Coast, is believed to have been fixed at 141s. Tin plates are firm and makers are reticent. American wire rods have sold at £29 c.i.f. Liverpool. Ferromanganese is firm, but business is difficult. From $375 to $400 c.i.f. is asked for delivery at American Atlantic ports. We quote as follows:

Tin plates, coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, maximum, 30s.
Ferromanganese, £45 nominal.
Ferrosilicon, 50 per cent, c.i.f., £35 upward.
On other products control prices are as quoted in THE IRON AGE, of July 19, p. 171.

Pig Iron and Finished Steel Strong—American Billets Scarce—Ferromanganese Nominal

(*By Mail*)

LONDON, ENGLAND, Aug. 14, 1917.—National requirements are as big as ever, especially for war and structural stock. Quantities of crude iron continue to be requisitioned for allied countries. Demand in general keeps ahead of the supply. This month has seen temporary interruptions incidental to the holidays, but strenuous efforts are being made to catch up with arrears against old contracts.

There has been greater activity in pig iron generally, the feature being the increased demand from Scotland. The huge outlet for home consumption more than makes up for the relatively curtailed export movement compared with pre-war times. As anticipated, the allotments of Cleveland iron have been on a larger scale this month. There has been a more insistent demand from the Allies, which has been met more generously, while the attempts of neutrals to secure supplies have proved fruitless. Deliveries of East Coast hematite iron against export contracts are kept down, although fair quantities were despatched recently to Italy.

There is a heavy demand for foreign ore, but sellers are hampered by lack of freight. The fuel supply leaves nothing to be desired. The total shipments from the Tees last month were 52,733 tons, showing a decrease of about 8000 tons against June. In the Midlands more furnaces have been put on basic iron, under government pressure, the supply of this description not being sufficient. The output of foundry grades may thus be curtailed.

No Offers of American Billets

Semi-finished steel has not improved, allocations being closely controlled. Little is available after making full provision for essential government work. Shell discard material is quickly absorbed at prices about equal to the official prices for sheet bars and billets. In spite of easier cable advices, no offers of American billets are heard of here, while the receipts of such material against old orders have virtually dried up. Some little business has been done lately in wire rods as £28 c.i.f. shipment last quarter, and at £29 and upward for parcels afloat, but consumers seem fairly well covered.

Demand for finished iron and steel is as conspicuous as ever. Mills as a rule are fully booked for months to come, so that there is a constant curtailment of supplies for the merchant trade. Maximum prices are easily obtainable for controlled material and the strain on plants accentuates the stringency in the uncontrolled branches. A large proportion of the production, especially of the bar mills, consists of special material not covered by the official standards. It is very difficult to place orders for steel for nearby delivery, makers having hardly anything to sell, and as much as £19 net was recently paid for mild steel bars for the home trade, although quotations now vary from about £17 10s. to £18 10s. net, according to delivery, and the position of the works. Iron and steel hoops range from £18 to £19 net.

The position of labor is becoming more difficult, while an additional war bonus has been granted to the men, this making the total increase conceded since the war began 15s. a week.

In tinplates a concession has been made as regards stock lots free from permits until Aug. 31 inclusive, for which a free open market has been restored up to that date, so that the fixed maximum basis price of 30s. net at works, recently introduced, does not apply in this case. This concession, made in response to strong complaints by merchants, has done much to remove the

serious difficulties and confusion which had arisen recently through the various interpretations of the vague circulars issued previously, while merchants have thus been given a more reasonable opportunity to liquidate stock acquired at prices ranging well upward to 40s. per box basis. Sales of free lots have, since the concession has been made, been sold up to about 46s., and there is but little left. After Aug. 31 all contracts will be subject to permits and be based on the fixed maximum price of 30s. Business under permits on this basis, however, is still held up pending the issue of the full schedule giving extras, allowances, etc.

High Prices for Manganese Ore

There is no alteration in ferromanganese, which is chiefly a nominal market with a strong undertone. Only a few transactions have been heard of lately at about £80 f.o.b. for loose to Continental ports subject to licenses, which are very hard to get hold of. There are still sellers at £400 c.i.f. for first half of 1918 to North American Atlantic ports, while orders can no longer be placed for next quarter. Home consumers are being accommodated to a fair extent at the fixed price of £25. A fair business was put through recently in Indian manganese ores for United Kingdom ports at about 3s. 4½d. c.i.f. per unit, but freightage is difficult and orders are hard to get through for the present.

Buffalo

BUFFALO, Sept. 4.

Pig Iron.—Almost the same conditions prevail that were noted last week. Inquiries continue to come in for various tonnages, and principally for 1918 delivery, but only a few result in orders. There is very little, if any, resale iron offering in this district and the expected lowering of prices based on such sales reported in other markets lack any foundation here. So far there is no surface evidence of price decline and prices for such sales as are made continue to be at about the same range as for the past two or three weeks—$53 to $55 for average foundry grades—but the market has not really been tested. We continue last week's price schedule for 1918 delivery, which is as follows, f.o.b. furnace, Buffalo:

High silicon irons	$55.00 to $56.00
No. 1 foundry	54.00 to 55.00
No. 2 X foundry	53.00 to 55.00
No. 2 plain	52.00 to 54.00
No. 2 foundry	51.00 to 53.00
Gray forge	51.00 to 53.00
Malleable	54.00 to 55.00
Basic	54.00 to 55.00
Lake Superior charcoal, f.o.b. Buffalo	55.00 to 60.00

Finished Iron and Steel.—The week has been extremely quiet both as to inquiry and orders. Even war order material has not been actively in the market, although there has been a little local inquiry for this class of material, and rumor of one large tonnage to be negotiated soon, also some inquiry from Canada. Prices remain nominal: bars, 4 to 4½c.; shapes, 4¼ to 4½c., and plates 8 to 10c. Tin plate waster accumulations are showing larger margin in quoted prices than for some time past, mills making prices according to their desire to move material. The Government has modified its embargo ruling on shipments to Canada so that structural material can be shipped without license, the same as bars, cold rolled steel and skelp. Plates still require Government license and also evidence that the material is required either for shipbuilding or for war purposes.

Old Material.—Most dealers report a more quiet market, with only moderate inquiry. Uncertainty as to prices which will be established by Governmental action is causing hesitation on the part of buyers. The bulk of material moving now is on old orders. Dealers are making every effort to complete their high-priced contracts, as they fear cancellation. Car shortage is becoming marked and is likely to grow more acute as Government requirement material takes increasing precedence over other shipments. There is no question that consumption of scrap material remains heavy and that stocks are low and no large tonnage available for prompt delivery. No changes in prices are noted for the week. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$33.00 to $34.00
Low phosphorus	45.00 to 48.00
No. 1 railroad wrought	43.00 to 45.00
No. 1 railroad and machinery cast	30.00 to 31.00
Iron axles	45.00 to 50.00
Steel axles	45.00 to 50.00
Carwheels	35.00 to 36.00
Railroad malleable	33.00 to 34.00
Machine shop turnings	18.00 to 19.00
Heavy axle turnings	26.00 to 27.00
Clean cast borings	20.00 to 21.00
Iron rails	43.00 to 44.00
Locomotive grate bars	20.00 to 21.00
Stove plate	21.00 to 22.00
Wrought pipe	29.00 to 30.00
No. 1 busheling scrap	28.00 to 29.00
No. 2 busheling scrap	18.00 to 19.00
Bundled sheet stamping scrap	20.00 to 21.00

New York

NEW YORK, Sept. 5.

Pig Iron.—Resale iron continues to be the one active product in the pig iron market and prices have receded to as low as about $50 furnace on this iron. The furnaces are holding pretty firmly, but concessions are sometimes made by furnaces having iron for prompt delivery for sale. On the whole, the market is extremely dull, but deliveries are being called for with considerable insistence. We quote for tidewater deliveries in the near future as follows:

No. 1 foundry	$51.25 to $53.25
No. 2 X	50.75 to 52.75
No. 2 plain	50.25 to 52.25
Southern No. 1 foundry	52.75 to 53.75
Southern No. 2 foundry and soft	52.25 to 53.25

Ferroalloys.—The ferromanganese market is extremely dull. Inquiries are very few and sales are meager for delivery either this year or in 1918. Reports from four of the five Atlantic ports through which ferromanganese comes from Great Britain show the receipts in July to have been only 2037 tons. It is probable that the missing figures would not bring the total above 2300 to 2400 tons. August receipts are not believed to have been much larger than those for July but present indications point to a better showing being made in September. New high records have been made in prices paid for manganese ore. From $1.25 to $1.30 per unit, seaboard, is reported to have been recently paid for a fair amount of Indian ore for importation into the United States. Receipts of Indian ore are said to have been fairly large so far this year. It is interesting to note that, according to our British correspondent, prices recently paid in Great Britain for Indian ore have been about 81c. per unit. Freight rates to this country on such ore are stated to have been recently as high as £6 per ton. The spiegeleisen market is quiet with inquiries for small lots for early delivery the only business reported, the quotation still being about $85, furnace. Ferrosilicon, 50 per cent, is unchanged at $200 to $225 for this year's delivery with $165 the quotation for contracts for next year. Ferrotungsten is quoted at $2.30 to $2.50 per lb. of contained tungsten, New York, with the ore concentrates selling at between $22 and $26 per unit. Ferrovanadium ranges from $4 to $5, Pittsburgh, per lb. of contained vanadium. Ferrocarbon-titanium is selling at 8c. per lb. in carload lots, 10c. per lb. in ton lots and 12½c. per lb. in lots less than a ton.

Structural Material.—Pronounced dullness marks the movement of plain material, proposals for new structures and closures of bids under contract. Nothing involving more than 200 tons was learned of. One mill in connection with business in finished steel offered for export incorporates in the contract a stipulation that in the event of embargoes the material must be taken and paid for, clearly requiring the buyer to put the material into storage. It seems likely that plain material may be obtainable in the fourth quarter for 4.25c., Pittsburgh, at deliveries as good as may be obtained at 4.50c., Pittsburgh, but with other mills as high as 5c., Pittsburgh is still asked, these being in the nature of premiums for comparatively small lots. We accordingly quote mill shipments, but without knowledge of specific transactions, at 4.445c. to 5.195c., New York,

while from warehouses shipments are made at 5c. to 5.50c. per lb., New York.

Steel Plates.—Extreme quietness prevails. No sizeable transactions since the last report are noted. Offerings of round lots of plates believed to be for resale because held up by embargoes have been numerous, but 10c. per lb. is asked. As to railroad cars, it is believed that the recent inquiries for axles and car accessories for 20,000 cars cover 10,000 for Russia and 10,000 for the Government's French railroad but early consummation of this business is not at present expected. We quote plates at 8.945c. and higher and out of store at 5c. and higher.

Iron and Steel Bars.—Japan has been making some active inquiries for lots of 1000 and even 2000 tons of steel bars, but in spite of the fact that the business is not restricted by license requirements mills are consenting to take only a portion. On this 4.50c. is commonly asked, but for fourth quarter business to domestic consumers 4c. has been done. Another mill appears willing to sell under desirable conditions at 4.25c. for fourth quarter, but for delivery in September and perhaps early October, where the steel is obtainable, 4.50c., Pittsburgh basis is quoted. Based on the few recent transactions we quote steel bars in say two or three months' delivery at 4.195c. to 4.695c., New York. In iron bars increased activity is noted in specifications and interest is being shown in fourth quarter transactions. We quote iron bars at 4.945c. to 5.195c. From New York district warehouses steel and iron bars are sold at 5c. to 5.50c.

Old Material.—The troubles of the scrap dealers are many, especially with the railroads, and it is so extremely difficult to make deliveries, that business is very light. Many permits have been issued to move cars on Government business, but anyone having scrap to move not on Government business has a very slim chance of being able to do so. Prices are to a very large extent nominal, but brokers quote prices about as follows to New York producers and dealers per gross ton New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania)	$27.50 to $29.50
Old steel rails (short lengths) or equivalent heavy steel scrap	27.00 to 29.00
Relaying rails	63.00 to 65.00
Rerolling rails	37.00 to 39.00
Iron and steel car axles	40.00 to 42.00
No. 1 railroad wrought	39.00 to 40.00
Wrought-iron track scrap	30.00 to 31.00
No. 1 yard wrought long	30.00 to 31.00
Light iron	8.00 to 10.00
Cast borings (clean)	18.50 to 19.50
Machine-shop turnings	18.50 to 19.50
Mixed borings and turnings	15.00 to 16.00
Wrought-iron pipe (1 in. minimum diameter, not under 2 ft. long)	27.00 to 28.00

Machinery cast is somewhat more active than other lines and slightly higher prices are being paid in some cases. For cast iron scrap dealers in New York City and Brooklyn are quoting as follows to local foundries per gross ton:

No. 1 machinery cast	$31.00 to $32.00
No. 1 heavy cast (column, building material, etc.	27.00 to 28.00
No. 2 cast (radiators, cast boilers, etc.)	26.00 to 28.00
Stove plate	18.00 to 20.00
Locomotive grate bars	18.00 to 19.00
Old carwheels	31.00 to 33.00
Malleable cast (railroad)	27.00 to 28.00

Cast Iron Pipe.—It develops that at the Government camp at Tenafly, N. J., very little cast iron pipe will be used, as wooden pipe is being utilized almost exclusively. There is fair business in private lettings, but no public business of importance has developed. Carloads of 6-in., 8-in. and heavier are quoted at $65.50 per net ton tidewater and 4-in. at $68.50.

The Canadian Car & Foundry Co., Montreal, is negotiating with the Russian authorities for a large portion of the big Russian order which will shortly be distributed to the Canadian companies, totalling, it is reported, 10,000 freight cars. The Canadian Car Co. is now working on an order for 2,000 freight cars for the Russian Government, which will be ready for delivery by October. These new orders will be a great help in keeping up the present working capacity of the Canadian car plants.

IRON AND INDUSTRIAL STOCKS

Very Serious Depression—Preparing to Pay War Taxes

The past week was one of very serious depression in the stock market. Some 70 issues in the stock exchange made new low records for the year and the break in the bond market was as great as that in stocks. Although one session was reduced to two hours and the stock exchange was closed on Saturday, the total sales were heavy. The depression was attributed to the rapid increase in estimates of the cost of the war and to the predominance of the radical element in the Senate in demanding higher and still higher taxation. Undoubtedly many business concerns are putting aside reserves with which to meet their obligations in paying taxes which will be called for under the new taxation measure now pending in the Senate. Whether the new issue of Liberty bonds will be subscribed for as rapidly as the first one is problematical.

Among the industrial stocks that registered losses during the past week were the following: Allis-Chalmers, 2⅜; American Can, 4½; American Car & Foundry, 4¾; American Locomotive, 6¼; American Steel Foundries, 5¼; Baldwin Locomotive, 8¼; Bethlehem Steel, 3½; Bethlehem Steel, Class B, 6¼; Colorado Fuel & Iron, 3¾; Crucible Steel, 11½; Gulf States Steel, 4½; International Harvester, 1⅞; Lackawanna Steel, 6; Midvale Steel, 2¾; National Enameling & Stamping, 3⅜; Pressed Steel Car, 7½; Republic Iron & Steel, 7⅜; United States Steel, 7¾; United States Steel preferred, ⅝. There were no gains recorded during the week in iron and steel stocks.

The range of prices on active iron and steel stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	23¼ - 25½	Lacka. Steel	77½ - 82⅛
Allis-Chal., pref.	82½ - 83	Lake Sup. Corp.	15⅞ - 17⅞
Am. Can, com.	38 - 42	Midvale Steel	51½ - 54
Am. Can, pref.	106 - 108	Nat.-Acme	32⅝ - 33⅞
Am. Car & Fdry., com.	66¼ - 70⅝	Nat. En. & Stm., com.	36½ - 40½
Am. Loco., com.	57½ - 63¼	N. Y. Air Brake	125¼
Am. Loco., pref.	102.-104½	Nova Scotia Steel	94 -100½
Am. Ship, com.	93	Pressed Stl., com.	60 - 62¼
Am. Steel Fdries.	61 - 64⅝	Pressed Stl., pref.	102
Bald. Loco., com.	55 - 63¼	Ry. Steel Spring, com.	44½ - 48¾
Bald. Loco., pref.	99¾ - 99⅞	Ry. Steel Spring, pref.	99
Beth. Steel, com.	107 -112	Republic, com.	77 - 83
Beth. Steel, class B	102⅝-109½	Republic, pref.	101⅝-102½
Beth. Steel, pref.	103 -107	Sloss, com.	45 - 48½
Case (J. I.), pref.	84	Superior Steel	37½ - 39⅝
Charcoal Iron, com.	8½ - 8⅝	Transue-Williams.	40 - 40¼
Chic. Pneu. Tool.	65 - 67¼	Un. Alloy Steel.	42½ - 44
Colo. Fuel	43 - 45	U. S. Pipe, com.	16⅝ - 18
Cruc. Steel, com.	63¼ - 71¾	U. S. Pipe, pref.	52
Cruc. Steel, pref.	99¼ - 99⅞	U. S. Steel, com.	104½-119⅞
Gen. Electric	145½-150⅝	U. S. Steel, pref.	116⅝-117
Gt. No. Ore Cert.	32⅝ - 34⅞	Va. I. C & Coke.	55 - 63
Gulf States Steel	96 -104	Warwick	9
Int. Har. of N. J., com.	108¾-112	Westing. Electric.	43½ - 45⅞
Int. Har. of N. J., pref.	113¼-113¼		

The Breitung Ore Properties

DETROIT, Sept. 4.—Legal obstacles involved in one of the largest iron mining mergers ever authorized in Michigan have been removed by the Michigan Securities Commission, which has issued a tentative order permitting the new $20,000,000 Breitung Iron Co. to sell $1,500,000 of notes in this State. The order was issued under the provision that the company make certain amendments to leases now held by subsidiary companies and have them approved by the attorney general.

Edward N. Breitung, New York, head of the new combination, who is now in Detroit, stated that these conditions will be met in every particular. The Breitung Iron Co. has been capitalized at $18,000,000, of which $15,000,000 is in common stock, $3,000,000 in preferred, and, in addition, there is $3,000,000 in notes, half of which amount it is intended to dispose of on the market. The other stock is all closely held. The merger combines all the Breitung iron ore properties in the Upper Michigan, Wisconsin and Minnesota.

Mr. Breitung has estimated the values of the various properties, including a steamboat line, at $20,000,000.. The chief mines in the combination are

the Mary Charlotte Mining Co., Negaunee, Mich.; Loon Lake Iron Co., Sault Ste. Marie, Ont.; Clifford Extension Mining Co., Iron Mountain, Mich.; Lucky Star Mining Co., Negaunee; Breitung Hematite Ore Co., Negaunee; Washington Iron Co., Humboldt, Wis., and several smaller companies. It is estimated the mines will have a production of 500,000 tons this year, 700,000 in 1918, and eventually will be worked up to an annual production of 1,000,000 tons of various grades.

Industrial Finances

With respect to the proposed redemption of $2,000,000 first preferred stock of the Gulf States Steel Co., the voting trustees announce that the consent of the holders of the requisite amount of the second preferred and common stock not having been obtained, the plan had been abandoned.

Net earnings of the Lake Superior Corporation for the fiscal year ended June 30, 1917, according to the annual report, amounted to $5,323,005, compared with $3,503,471 in the year preceding. The surplus balance after allowing for interest charges, depreciation, sinking fund, etc., totalled $429,258, an increase of $70,540.

The Sullivan Machinery Co., Chicago, reports for year ended Dec. 31 net $1,313,906 against $540,207 previous year, and surplus after all charges and dividends $603,558 for 1916, against $197,179 for 1915.

President George M. Verity, American Rolling Mill Co., Middletown, Ohio, has issued a general letter to the company's stockholders recommending that its common stock carry a par value of $25 instead of $100 as at present. Under the plan, common stockholders would receive four shares with a par value of $25 for each $100 share surrendered. The proposition outlined is the third step in the completion of the merger of the Columbus Iron & Steel Co. into the American company, and the refinancing incident thereto.

The Domhoff & Joyce Co., pig iron and coke merchant, with head offices in Cincinnati, has increased its capital stock from $50,000 to $500,000. This increase was decided on to take care of the large increase in the company's business during the past few years. The company maintains branch offices in Chicago, Cleveland, Indianapolis and other cities. John Sergeant is president and treasurer and Chas. A. Sergeant secretary and assistant treasurer.

The Beaver Dam Manufacturing Co., Beaver Dam, Wis., maker of agricultural machinery, tools, implements, etc., has filed a voluntary petition in bankruptcy. The liabilities are scheduled at $249,746 and the assets at $269,936. Unsecured claims are listed at $129,569.

Dividends

The Dominion Iron & Steel Co., Ltd., 3½ per cent on the preferred, payable Oct. 1.

The Dominion Steel Corporation, Ltd., quarterly, 1 per cent on the common, payable Oct. 1.

The General F.reproofing Co., quarterly, 1¾ per cent on both the common and preferred, payable Oct. 1.

The La Belle Iron Works, quarterly, 3 per cent on the common and 2 per cent on the preferred, both payable Sept. 29.

The Moline Plow Co., quarterly, 1½ per cent on the second preferred, payable Sept. 1.

The Packard Motor Car Co., quarterly, 1¾ per cent on the preferred, payable Sept. 15.

The Wheeling Steel & Iron Co., quarterly, 2 per cent and extra 2 per cent, payable Oct. 1.

Women have been employed in the stores department of the Standard Steel Works Co., Lewistown, Pa. About 50 girl clerks have taken the places of men called to the colors. The company reports it has no trouble in securing young women as employees and has a waiting list of 150.

South Africa's steel output in 1916 as represented by the United Steel Corporation, was 9152 tons made up as follows: Ingots, 4650 tons; light rails, 1635 tons; structural steel, 450 tons, and general merchant steel, 2417 tons. Extensions to the plant will insure a large output in 1917.

OBITUARY

ALBERT S. SMITH, president of the Smith & Mills Co., Cincinnati, died suddenly of heart disease at his home Sept. 3, aged 59. He was a native of Ohio and went to Cincinnati at the age of 17, entering the employ of the John Steptoe Co. In 1885 he formed a partnership with the late James Mills, establishing the company which he headed at the time of his death. He was a prominent Mason, a member of the Business Men's Club and other social and business organizations.

ALBERT S. FEARS, treasurer of Reed, Fears & Miller, Inc., Boston, dealers in pig iron and coke, died Aug. 29.

Pittsburgh and Nearby Districts

At a meeting of the executive committee of the Pittsburgh Coal Co., held in that city, Aug. 30, a revised contract with the United States Steel Corporation for a large tonnage of coal running over a number of years, effective on and after Feb. 15, 1917, was approved and authorized to be executed. Under the revision of this contract the coal company secures a better price for its coal than under the old contract.

The LaBelle Iron Works, Steubenville, Ohio, is reported to have purchased recently about 2500 acres of coal lands in Ohio and Brooke counties, West Virginia.

The A. T. Nye & Son Co., Marietta, Ohio, stove and range manufacturer, has sold its works to the Government for the establishment of a marine supply plant at that place. As a result, the company is now looking for another location to build a stove and range plant, and would like to locate where there are some buildings already available. The concern has been in business since 1828, and has been located where it is now for 50 years, having made but one change in location in the 89 years that it has been in business. The Government will use the plant, which will be turned over to the Government in about eight months, as a distributing point for all the supplies used by the Government fleet in the Wheeling (W. Va.) district.

Marietta furnace of E. J. Lavino at Marietta, Pa., went in blast on Aug. 21 on ferromanganese.

Defective Ammunition

WASHINGTON, Sept. 4.—The announcement that practically one-third of the small-arms ammunition sent to France for General Pershing's troops has been found defective from chemical reaction set up in the primers after manufacture at the Frankford Arsenal has been followed by immediate steps looking to thorough investigation by the military committees of both houses and by a special board of army officers to be appointed by the Secretary of War.

Immediately after the publication of this statement General William Crozier, Chief of the Ordnance Bureau, addressed a letter to Adi. Gen. McCain recommending that a board of investigation be appointed. The Senate and House are investigating.

The Swedish Ironmasters' Association in 1915 appointed a committee to study the whole question of future supplies of charcoal, as according to careful estimates the country's stock of timber will have to be husbanded so as to allow for a complete replacement in 30 years. With a view of saving timber the three systems of burning in use (in charring heaps, kilns and using up waste in saw-mills) and the question of the more extensive use of electric furnaces, are receiving closer attention. Late statistics put the annual consumption of charcoal in Sweden at about 700,000 tons.

The Tungsten ore output of the Federated Malay States, according to the report of the Senior Warden of Mines, was 515 tons in 1916 against 292 tons in 1915. Of the 1915 production 235 tons was wolfram and 57 tons was scheelite. Most of the 1916 output was low grade concentrate.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Denver pipe, 76.1c.; minimum carload, 46,000 lb.; structural steel and steel bars, 76.1c., minimum carload, 40,000 lb.; Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 60,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in., angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 4.00c.

Wire Products

(Prices of independent mills)

Wire nails, $4 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of $2, and shorter than 1 in., $2.50. Bright basic wire, $4.05 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.95; galvanized wire, $4.65; galvanized barb wire and fence staples, $4.85; painted barb wire, $4.15; polished fence staples, $4.15; cement-coated nails, $3.90 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 43 per cent off list for carload lots, 42 per cent off for 1000-rod lots, and 41 per cent off for small lots, f.o.b. Pittsburgh.

Nuts and Bolts

Discounts in effect for large buyers are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 40 per cent, small cut thread, 35 and 2½ per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq. blank, $2.10 off list, and tapped, $1.90 off; hex. blank, $1.90 off, and tapped, $1.70 off; nuts, c. p. c. and t. sq. blank $1.70 off, and tapped, $1.50 off; hex. blank, $1.60 off, and tapped, $1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

Wire Rods

Soft Bessemer and open-hearth rods to domestic consumers at $90 to $95; high-carbon rods made from ordinary open-hearth steel $95 to $100, and special steel rods with carbons running from 0.40 to 0.60, $100 to $110 at mill; above 0.60 carbon, $115 to $120.

Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. and larger, $7.00; ⅝ in., 7/16 in. and ½ in., $7.00 base. Boat spikes are occasionally quoted $7.00 to $8.00, all per 100 lb., f.o.b. Pittsburgh, but some makers are quoting higher. Track bolts with square nuts, 7c. to 7.50c. to railroads, and 8c. to 8.50c., in small lots, for fairly prompt shipment.

Steel Rails

Angle bars at 3.50c. to 3.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 4c. to 4.25c. at mill. Light rails, 25 to 45 lb., $75 to $80; 16 to 20 lb., $80 to $81; 12 and 14 lb., $82 to $83; 8 and 10 lb., $83 to $84; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard Bessemer rails, $38; open-hearth, $40, per gross ton, Pittsburgh.

Tin Plate

Effective July 31, prices on all sizes of terne plate were advanced from $2 to $2.50 per package and are now as follows: 8-lb coating, 200 lb., $16 per package; 8-lb. coating, I. C., $16.30; 12-lb. coating, I. C., $17.50; 15-lb. coating, I. C., $18.25; 20-lb. coating, I. C., $19; 25-lb. coating, I. C., $20; 30-lb. coating, I. C., $21; 35-lb. coating, I. C., $22; 40-lb coating, I. C., $23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 4c. to 4.50c. for delivery late this year, and 4.50c. to 5c. from warehouse, in small lots for prompt shipment. Refined iron bars, 4.75c.; railroad test bars, 5.25c. in carload and larger lots f.o.b. mill.

Wrought Pipe

The following discounts on steel are to jobbers for carload lots on the Pittsburgh basing card in effect from May 1, 1917, all full weight, except for LaBelle Iron Works and Wheeling Steel & Iron Co., which quote higher prices, and National Tube Co., which adheres to card of April 1.

Steel			Iron		
		Butt Weld			
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	42	15½	⅛ and ¼	23	+4
½	46	31½	⅜	24	+3
¾ to 3	49	35½	½	28	10
			¾ to 1½	33	17
		Lap Weld			
2	42	29½	2	26	13
2½ to 6	45	32½	2½ to 6	28	15
7 to 12	42	28½	7 to 12	25	12
13 and 14	32½	..			
15	30	..			
		Butt Weld, extra strong, plain ends			
⅛, ¼ and ⅜	38	20½	⅛, ¼ and ⅜	22	5
½	43	30½	½	27	14
¾ to 1½	47	34½	¾ to 1½	33	18
2 to 3	48	35½			
		Lap Weld, extra strong, plain ends			
2	40	28½	2	27	14
2½ to 4	43	31½	2½ to 4	29	17
4 to 6	42	30½	4½ to 6	28	16
7 to 8	38	24½	7 to 8	20	5
9 to 12	33	19½	9 to 12	15	3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5½ points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

Nominal discounts on less than carload lots, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes, and from April 2, 1917, on lap-welded steel tubes are as follows:

Lap-Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	31	1½ in.	23
2¼ in.	28	1¾ and 2 in.	35
2½ and 2¾ in.	34	2¼ in.	32
3 and 3¼ in.	34	2½ and 2¾ in.	38
3½ to 4½ in.	34	3 and 3½ in.	43
5 and 6 in.	33	3½ to 4½ in.	No quotations
7 to 13 in.	30	5 and 6 in.	37
		7 to 13 in.	34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths. Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets

Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days.

[Open-hearth stock, $5 per ton above these prices.]

	Cents per lb.
Blue Annealed—Bessemer	
Nos. 3 to 8	8.00 to 8.50
Nos. 9 and 10	8.25 to 8.50
Nos. 11 and 12	8.50 to 8.75
Nos. 13 and 14	8.75 to 9.00
Nos. 15 and 16	9.00 to 9.25
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	8.30 to 8.80
Nos. 22 and 24	8.35 to 8.85
Nos. 25 and 26	8.40 to 8.90
No. 27	8.45 to 8.95
No. 28	8.50 to 9.00
No. 29	8.55 to 9.05
No. 30	8.65 to 9.15
Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	9.00 to 9.50
Nos. 12 and 14	9.10 to 9.60
Nos. 15 and 16	9.25 to 9.75
Nos. 17 to 21	9.40 to 9.90
Nos. 22 and 24	9.55 to 10.05
Nos. 25 and 26	9.70 to 10.20
No. 27	9.85 to 10.35
No. 28	10.00 to 10.50
No. 29	10.25 to 10.75
No. 30	10.50 to 11.00
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	7.80 to 8.30
Nos. 17 to 21	7.85 to 8.35
Nos. 22 to 24	7.90 to 8.40
Nos. 25 to 27	7.95 to 8.45
No. 28	8.00 to 8.50
No. 29	8.05 to 8.55
No. 30	8.05 to 8.55
Nos. 30½ and 31	8.10 to 8.60

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin.	Lead		Spelter	
Aug.	Lake	Electro-lytic	New York	New York	St. Louis	New York	St. Louis
29	25.50	25.50	61.50	10.50	10.37½	8.37½	8.12½
30	25.50	25.50	61.75	10.45	10.32½	8.25	8.00
31	25.25	25.25	61.75	10.37½	10.25	8.25	8.00
Sept.							
1	25.25	25.25	....	10.37½	10.25	8.25	8.00
4	25.25	25.25	61.00	10.25	10.12½	8.25	8.00

NEW YORK, Sept. 5.

The markets are dull and featureless. Prices are lower in all cases and mostly nominal. Copper is lifeless. Tin is quiet and steady. Lead is dull and weaker. Spelter is stagnant and slowly sagging. Antimony is lifeless and lower.

New York

Copper.—The air is full of baseless rumors regarding the price which the Government and the Allies will pay for their purchases. No definite information is ascertainable nor is it even known yet what prices will be paid for the 60,000,000 lb. which the Government purchased some months ago. This potent uncertainty, together with labor and other troubles, continues to keep the market in a state of near paralysis. As a result buying is only from hand to mouth with not enough to establish a market and prices are entirely nominal. Yesterday both Lake and electrolytic were nominally quoted at about 25.25c., New York, with quotations varying on either side of this about ¾c., depending upon the relations of buyer and seller. For the last quarter the general quotation seems to be 24c. to 25c., New York. Consumption is proceeding at a rapid rate, but production is being considerably interfered with by labor troubles in the West. These facts, together with the certainty that sooner or later extensive buying must materialize, are the only bright spots in the market. The London market is unchanged at £137 for spot electrolytic and £133 for futures.

Copper Averages.—The average price of both Lake and electrolytic copper for the month of August, according to daily quotations in THE IRON AGE, was 27.24c.

Tin.—The market continues featureless with activity only spasmodic. On Aug. 29 there was considerable inquiry with sales of about 250 tons of Straits tin reported. On the same day there were sales of tin, exsteamer to arrive soon, at 60.87½c., New York, also of December shipment from the Straits at 57.12½c., and of metal due from the Straits in September at 60.50c. After that demand declined and inquiries were few until Aug. 31, on which day there developed a fair demand for futures, but no sales were reported. Thursday, Aug. 30, was practically a holiday in honor of the New York National Guard and the market was neglected, but metal was offered at 61.75c. with few buyers. Yesterday after another holiday there was a little inquiry, developing into sales of 100 to 125 tons, mostly spot. The quotation yesterday was 61c., New York. Arrivals this month, including yesterday's, were 325 tons, with the quantity afloat 4015 tons. The London market yesterday was £243 10s. for spot Straits, a decline of 10s. from last week.

Lead.—The feature in the lead market the past week was the reduction by the American Smelting & Refining Co. of its price by ½c. per lb., to 10.50c., New York. An unusual statement in connection with this is to the effect that the company is willing to book orders at the new price without any conditions stipulated. This is regarded as a great change in policy and as indicating an increase in the supply of lead. In general, conditions remain unaltered with buyers still holding off. Sellers and buyers seem as far apart as ever and there has been no purchasing on a large scale. Prices in the outside market have also receded, metal being offered at 10.37½c. on Friday and Saturday, with October delivery offered at 10.25c., St. Louis, and November at 10c., St. Louis. Yesterday the outside market broke to 10.25c., New York, at which price it is reported a 100-ton lot changed hands. Active buying is not looked for until confidence in business conditions is renewed.

Spelter.—Pronounced dullness continues in the spelter market and quotations are a little lower but largely nominal, actual transactions being confined to very small lots coming from sellers anxious to do a little business or from resale sources. The general nominal quotation yesterday was about 8c., St. Louis, or 8.25c., New York, for prime Western. Last quarter is from ⅛c. to ¼c. higher. Under present conditions there is no incentive to buy and no inclination to sell with the metal so near the cost-of-production basis. The only ray of hope is the accumulating demand which must express itself sooner or later from both domestic and foreign sources.

Antimony.—In view of continued lack of demand the market is lower. Chinese and Japanese grades are quoted at 14.50c., New York, duty paid.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, is unchanged at 47c. to 49c. per lb., New York.

Old Metals.—The market is weaker. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	26.50 to 27.00
Copper, heavy and wire	25.50 to 26.00
Copper, light and bottoms	22.50 to 23.50
Brass, heavy	17.50 to 18.50
Brass, light	13.00 to 14.00
Heavy machine composition	24.50 to 25.00
No. 1 yellow rod brass turnings	16.75
No. 1 red brass or composition turnings	19.00 to 21.00
Lead, heavy	9.25 to 9.375
Lead, tea	7.75
Zinc	6.50

Chicago

CHICAGO, Sept. 4.—Quiet is the rule throughout the market. There is no scarcity of anything, but consumers are marking time, pending some shaping of the market in regard to prices. We quote as follows: Casting copper, 25c.; Lake, 27.50c.; electrolytic, 26c.; tin, carloads, 62c.; small lots, 64c. to 65c.; lead, 10.25c.; spelter, 8c.; sheet zinc, 19c.; antimony, 17c. to 18.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22.50c.; copper clips, 21.50c.; copper bottoms, 21c.; red brass, 21c.; yellow brass, 15c.; lead pipe, 8c.; zinc, 5.50c.; pewter, No. 1, 35c.; tinfoil, 40c.; block tin, 45c.

St. Louis

ST. LOUIS, Sept. 4—Non-ferrous metals have shown very little feature in this market, being generally easier, if anything. The close to-day on Missouri product, carload lots, was: Lead, 10c.; spelter, 8c. to 8.25c. In less than carload lots the quotations to-day were: Lead, 11c.; spelter, 9c.; tin, 66c.; lake copper, 30c.; electrolytic copper, 29.50c.; Asiatic antimony, 18c. In the Joplin district there was very little change apparent in the prices, the out-turn or the tone of the market. Zinc blende ranged from $65 to $75 per ton, basis of 60 per cent metal, with the average for the district for the week at $69 per ton. Calamine was quiet at $35 to $42 per ton, basis of 40 per cent metal, with the week's average for the district at $39.50 per ton. Lead was rather easier, but the top quotation was held up to $100 per ton and the average for the week for the district was $99 per ton. The turn-in continues to be very heavy, and this in conjunction with the inability to get cars and the rather slow demand is holding prices down. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 11c.; heavy yellow brass, 14.50c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 22.50c.; pewter, 25c.; tinfoil, 42c.; lead, 7c.; tea lead, 6c.; zinc, 5c.

The Albert E. Baxter Engineering Co., Ellicott Square Building, Buffalo, has completed plans for a cereal mill and warehouse 112 x 120 ft., 3 stories, to be erected at New Brighton, S. I., by the Tanner Gross Co., Inc., 25 Beaver Street, New York, to cost $125,000.

The T. Tolhurst Machine Co., 648 Fulton Street, Troy, N. Y., has let a contract for wood working building 60 x 220 ft. and 40 x 60 ft., 1 story, at Green Island, N. Y.

CONTRACTS FOR SHIPS

Steel Given Preference—No More Contracts for Wooden Vessels

WASHINGTON, Sept. 4.—The long pending contracts with the Submarine Boat Corporation, the American International Corporation, and the Merchants' Shipbuilding Corporation for the construction in Government financed yards of fabricated steel ships have been completed and it is officially stated will be formally executed on Sept. 6. The three concerns have been notified to begin active work without further delay and the Emergency Fleet Corporation has been assured in return that the first ship will be delivered in eight months and thereafter one vessel will be completed every two days until all are finished.

Owing to the fact that Congress has not yet acted upon the urgent recommendation of the Shipping Board for an additional appropriation of approximately $915,000,000, the entire program of fabricated steel ships will not be ordered at the outset. Initial orders for 50 ships each will be placed with the Submarine Boat and Merchants' Shipbuilding corporations and for 60 ships with the American International Corporation. Ultimately upwards of 300 fabricated steel ships will be ordered and the total may possibly reach 400, if Congress will supply the necessary funds.

Government Furnishes Steel

Under the terms of the contracts, the Government will furnish the steel for the fabricated ships and on the basis of the informal orders already placed, arrangements are being made to secure 458,000 tons of steel plates and shapes. The vessels ordered will be chiefly of 5000 and 7500 tons each, but a few 9000-ton ships will probably be built. As the Shipping Board desires to procure a maximum of tonnage at the earliest practicable date, its preference is for two 5000-ton ships, which can be built in eight months rather than one 9000-ton vessel requiring considerably longer for its construction.

The terms upon which the fabricated steel ships are to be built are necessarily somewhat complicated. They are based upon the cost to the Government of about $150 per ton, which includes the cost of the steel which the Government furnishes. The contractors, however, are guaranteed a certain profit per ton over and above all expenses including reasonable overhead charges. As the Government will finance the shipbuilding plants, it will have the option to take them over at the end of the war. If it decides not to do so, it is understood that some form of amortization allowance will be made.

Aside from the orders for fabricated steel ships the Emergency Fleet Corporation has made contracts for 570 vessels of which 429 are wooden, 58 composite and 83 steel. The bulk of these contracts were placed by General Goethals while serving as manager of the Emergency Fleet Corporation. The wooden ships are embraced in 62 contracts ranging from two to 20 ships each, the contracting yards being located at almost every available point on the Atlantic and Pacific coasts.

May Stop Building

Formal announcement has been made by the Shipping Board that no more contracts will be placed for wooden ships. In fact, it is a serious question whether all the wooden ships already ordered will be built. In the early days of the Emergency Fleet Corporation, when the wooden ship was being strongly urged as the key to the problem of defeating the submarine campaign, orders were placed right and left with shipbuilding concerns whose yards either existed wholly on paper or required considerable financing before the actual work of construction could begin. When these builders undertook to buy lumber to carry out their contracts, they encountered other obstacles. The pine mills of the South and those producing fir in the Northwest had promised lumber at certain prices, but as the market had risen substantially they were reluctant to recognize anything except written contracts. This situation has been remedied to some extent and the Government is prepared to go to any lengths to compel deliveries of any desired material.

The value of the wooden ship for foreign service, however, has come to be very seriously questioned by experts and it is more than probable that the bulk of those ordered will be operated in coastwise traffic for the purpose of releasing other ships better suited to the foreign trade. Even this makeshift will prove disappointing, it is feared, chiefly for the reason that coastwise vessels are not calculated to meet the existing conditions of the submarine campaign. It has been amply demonstrated that swift vessels are necessary for this work and ample statistics prove that an overwhelming percentage of the vessels sunk are of less than 14 knots speed. Vessels capable of making 15 or 16 knots are able to outrun the undersea boats.

Watertight Compartments

Another difficulty about utilizing coastwise vessels in the transatlantic service is the fact that they are not constructed with watertight compartments. This method of construction has been found to be very effective and it is believed that ships built in accordance with the approved plans of the Emergency Fleet Corporation will remain afloat even after being fairly hit by two torpedoes. A combination of speed with numerous watertight bulkheads, therefore, is believed to render vessels almost immune. These two features are being kept constantly in view in the revision of the plans of the vessels now in course of construction in American shipyards, which have been commandeered by the Shipping Board.

Information received here through official sources indicates that all the important nations of the world are bending their energies to merchant ship construction. Even the Allies are no longer giving their first thought to the building of warships, but are constructing cargo vessels as rapidly as possible for the double purpose of combating the submarine and of being in position when the war is over to extend their foreign trade. England's ship tonnage losses are said to have been so heavy that she feels she must forego warship building in favor of merchant vessels in order to hold her position in the commerce of the world. Lloyds Register shows the addition of 63 vessels of large tonnage to the British merchant marine between June 8 and July 17. Germany's shipyards are reported as busy night and day with cargo vessels ranging from 5000 tons up to the Bismarck, a giant liner of 56,000 tons, the largest merchant ship in the world, which is to be launched after the war.

The United States Shipbuilding Labor Adjustment Board has been completed by the appointment of Edward F. Carry of Chicago, president of the Haskell-Barker Car Co., which has its plant at Michigan City, Ind. The board is now equipped to adjust labor disputes in American shipyards where the United States Shipping Board or the Emergency Fleet Corporation has ships under construction or repair. W. L. C.

The Youngstown Sheet & Tube Co. has given the Unit Construction Co., contracting engineers, Title Guaranty Building, St. Louis, the work of designing and constructing 100 group houses of reinforced concrete for industrial workers, together with the layout of streets, sewers and water lines in colony plan, at Youngstown, Ohio. The cost of initial development is estimated at $500,000.

At the meeting of American Gear Manufacturers' Association to be held at the Edgewater Beach Hotel, Chicago, Sept. 14 and 15, papers are to be presented as follows: Heat treating and hardening of gears; inspection of gearing; spur gearing by the rotary or disk cutting process, and spur gears by the shaper method.

The American Brake Shoe & Foundry Co., Erie, Pa., will make extensions in its machine works to handle a contract for Government work recently received.

PERSONAL

W. H. CUNNINGHAM

Wilfred H. Cunningham has been elected president of Lake Superior Corporation at Sault Ste. Marie, Ont. He is a member of the Philadelphia banking house of Kurtz Bros. and his election is understood to be a recognition of the large Philadelphia interest in the corporation's securities, which has expanded greatly within the last two years.

Three important changes in the firm of M. A. Hanna & Co., Cleveland, took place Sept. 1, when Robert L. Ireland retired from membership and L. C. Hanna, Jr., and James D. Ireland became members of the firm, which now includes in addition to the two new members, L. C. Hanna, Sr., Mathew Andrews, H. M. Hanna, Jr., F. B. Richards, William Collins and R. F. Grant. L. C. Hanna, Jr., after graduating from Yale University, was associated with the Republic Iron & Steel Co. for a year and spent some time in the Birmingham, Ala., district. Since then he has been in various departments of the offices of M. A. Hanna & Co. James D. Ireland has also been associated with the firm for a number of years. He has been in charge of the Duluth offices, and general manager in charge of ore properties in the Northwest. He is a graduate of Yale and of the Massachusetts Institute of Technology. R. L. Ireland, the retiring member, is prominently identified with Cleveland industries. He was formerly actively associated with the American Shipbuilding Co., of which he is still a director, and has other extensive interests.

Edward Worcester, first vice-president of the National Tube Co., Pittsburgh, has returned from a vacation spent in Maine.

Alfred G. Place, for some time chief electrician of the Youngstown Sheet & Tube Co., Youngstown, Ohio, has been named consulting electrical engineer and has been succeeded as chief electrician by L. J. Hess. Mr. Hess is from the Joliet plant of the Illinois Steel Co. He will assume his new duties at once.

E. B. Blandy, for the past seven years connected with Pilling & Crane, New York, has resigned to become secretary of the Northern Ore Co. of New York, which some months ago acquired the Keystone blast furnace, Island Park, near Easton, Pa., formerly owned by the Thomas Iron Co.

Charles E. Hathaway, assistant treasurer Fore River Shipbuilding Corporation, Quincy, Mass., has resigned owing to ill health and has been succeeded by John F. Hanley, head bookkeeper. H. Edgeworth Frick, assistant superintendent of the hull department, has resigned after 13 years' service to accept a position on the inspection staff of the United States Shipping Board and has been assigned to duty in Delaware.

Irving V. Thomas, formerly factory manager of the old Lozier Motor Co., Detroit, now is production manager for the Hercules Motor Mfg. Co., Canton, Ohio.

R. G. Taylor, sales representative for the American Car & Foundry Co.'s Detroit plant, has been commissioned a captain in the ordnance officers' reserve corps.

John W. Boehne, former mayor of Evansville, Ind., and former representative in the Congress, has been elected president of the Indiana Stove Works at Evansville to succeed the late Jacob Fischer.

Howard C. Mull has been promoted from sales representative to sales agent in charge of the Chicago office of the Verona Tool Works of Pittsburgh.

Dr. E. E. Pratt, formerly chief of the Bureau of Foreign and Domestic Commerce at Washington, is now connected with the Pacific Commercial Co., 11 Broadway, New York. The company's head office is at Manila, and it carries on a large business in the Philippines and the Far East. It is closely associated with Andersen, Meyer & Co. and with the Hartmann Brothers, importers, New York.

J. P. Bennett, who recently resigned as assistant superintendent of the rolling mills at the plant of the Bethlehem Steel Co., Steelton, Pa., was presented a diamond ring by employees of his department, Aug. 24, with presentation speech by R. C. Parsons, superintendent of the structural and rail mills. Mr. Bennett will become assistant superintendent at the plant of the Keystone Steel & Wire Co., Peoria, Ill.

William Stampleman, formerly associated with the Universal Tool & Die Works, New York, has recently been appointed secretary of the Ever Ready Machine & Tool Works, 180 Worth Street, New York.

George D. Kirkham, sales agent, who has been in charge of the St. Paul office of the American Steel & Wire Co., has returned to the Chicago office. H. S. Durant has returned from Washington, D. C., to resume his duties at the St. Paul office.

H. J. Woodward has been made general sales manager of the Republic Rubber Co., Youngstown, Ohio. Mr. Woodward formerly held a similar position with the Knight Tire & Rubber Co., Canton, Ohio, which was recently taken over by the Republic company, and will now act as sales manager of both concerns.

Dudely R. Kennedy, assistant to J. A. Campbell, president of the Youngstown Sheet & Tube Co., Youngstown, Ohio, spoke at the annual convention of the International Association of Industrial Accident Boards and Commissions in Boston, Aug. 23.

F. G. Schulz, formerly with the New York Central railroad, has accepted a position as assistant to Horton Penrose, Pittsburgh manager of Shimer & Co., Philadelphia, producer of pig iron, ferromanganese and allied products.

Charles E. Satler, secretary of the United Engineering & Foundry Co., Pittsburgh, has returned from an extended vacation spent at Nantucket, Mass.

Louis C. Witkowski has been elected sales manager of the American and Foreign Sales Corporation, Munsey Building, Washington, D. C. For a number of years he was Washington representative for the Joseph Dixon Crucible Co. and for manufacturers of metal goods and machinery. The American and Foreign Sales Corporation was organized to represent manufacturers in negotiations with various branches of the United States Government.

R. A. Lewis, general superintendent of the Lehigh plant of the Bethlehem Steel Co., has been appointed general superintendent of the Bethlehem plants, including Lehigh, Saucon and Northampton plants. L. W. Adams, superintendent of the Saucon plant, has resigned and has been succeeded by Timothy Burns, who has been transferred from the Maryland plant of the company. The Northampton plant is the name now given to what was previously known as the Lehigh coke plant.

John A. Stevens, engaged in consulting engineering, with steam power plants as a specialty, at 8 Merrimack Street, Lowell, Mass., has organized a department to cover the design and superintendence of construction of factory buildings.

W. E. Firth, safety engineer for a number of years with the Midvale Steel Co., Nicetown, Philadelphia, has resigned to take a vacation.

Paul Caldwell of the Pittsburgh office of the General Electric Co. has accepted a position with the Cleveland Crane & Engineering Co. in the sales department and will take charge of its New York office about Oct. 1.

C. A. Crowe, formerly manager Grand Rapids office of the Asbestos Protected Metal Co., Pittsburgh, has been placed in charge of the Detroit office, located in the Penobscot Building. N. W. Taber, formerly the Detroit manager, has been appointed factory manager.

J. E. McAllister has been appointed vice-president and general manager of the National Steel Car Co.,

Hamilton, Ont., succeeding Basil Magor, who has held the position for several years.

A. T. Perrin, assistant chief draftsman of the Dominion Bridge Co., Lachine, Que., has resigned to become manager of the Rapid Tool & Machine Co.'s plant at Iberville, Que., the head office of which is located at Lachine, Que.

W. J. Longmore, general purchasing agent of the Westinghouse Electric & Mfg. Co., Pittsburgh, is spending his vacation at Muskoka Lake, Canada.

Charles L. Taylor, president of the Carnegie Hero Fund Commission, Pittsburgh, has become affiliated with the Loughead Aircraft Mfg. Co., Santa Barbara, Cal., the management of which has asked for authorization to increase its capital stock from $40,000 to $1,000,000. The concern has selected a site in Santa Barbara and expects to begin making deliveries of various types of airplanes to the Government within 90 days.

J. E. Johnson, Jr., New York, has gone to the Pacific coast on a professional trip which will require six or seven weeks.

Legal Aspects of Transportation

BY A. L. H. STREET

Time for Filing Freight Loss Claims.—Plaintiff is not entitled to recover against defendant railway company on account of loss of castings in transit under an interstate shipment, where no notice of the loss was given within four months after a reasonable time for delivery had elapsed, as required by the conditions stated in the bill of lading. It is beyond the power of the railway company to waive compliance with this condition, since such waiver would amount to an unjust discrimination in plaintiff's favor, in violation of the Interstate Commerce Act. (Massachusetts Supreme Judicial Court, May 29, 1917. Metz Co. vs. Boston & Maine Railroad, 116 Northeastern Reporter, 475.)

Carrier's Liability for Disregarding Routing.—Where goods are delivered to a railway company for transportation over its road and connecting lines, under stipulation in the bill of lading directing delivery to a given carrier at a certain point, the company renders itself liable for loss sustained by the shipper through failure to observe the routing directed. (Kansas Supreme Court, May 12, 1917. Bennett vs. Missouri Pacific Railway Co., 164 Pacific Reporter, 1084.)

Liability for Freight Charges—When Seller Is Not Responsible for Transit Delays.—The fact that a salesman who took an order for four engines represented to the buyer that if the four were shipped together the freight charges would not exceed a certain amount did not render the seller liable for higher proportionate freight charges on two engines which were shipped instead of the four ordered, the buyer having accepted the two with knowledge of all the pertinent facts, including knowledge as to the freight rates applicable. Where goods are shipped under bill of lading attached to draft drawn on the buyer and he takes up the bill of lading while the goods are in transit, he instantly becomes the owner and must look to the carrier for any delay in transportation subsequently occurring. (Texas Court of Civil Appeals, May 2, 1917. J. I. Case Threshing Machine Co. vs. Lochridge & Denny, 195 Southwestern Reporter, 266.)

Samuel Swett, 149 Broadway, New York, has been appointed the exclusive agent in the United States for George Craddock & Company, Ltd., Wakefield, England, whose steel works, rolling mills, wire drawing mills and wire rope works are located at that place.

The Cleveland & Pittsburgh Railroad is said to have bought recently close to 1,000 acres four or five miles south of Steubenville, O., on which it is reported the buyer will erect large railroad machine shops, using most of the ground for yards.

Sweden's pig iron output in 1916 is reported by the British Consul General in Sweden, H. W. Harris, as 737,000 tons as compared with 730,000 tons in 1913.

WAR CONVENTION OF BUSINESS

Government Control of Prices and Other Questions to Be Considered

WASHINGTON, Sept. 4.—To give the business men of the country an opportunity to consider and discuss some of the most serious war problems which have recently developed, a special war meeting of the Chamber of Commerce of the United States will be held at Atlantic City beginning Sept. 18 and lasting four days. It is believed the attendance will surpass that of any gathering even at this famous seashore convention city. The Government control of prices, the establishment of priority in requirements of the Government and of individuals for materials and products, the supply of which is limited, will be the leading topics, but there will also be discussed the general industrial relations of business to the nation during the war and how the Government can best procure the supplies of materials most needed and handle the great business problems which are daily arising. Officials of the National Chamber emphasize the opportunity which the coming convention will give of demonstrating to the country that business is not only backing up the President, but is now coming forward to consider further how it may render a greater service in winning the war.

"The convention will give representatives of business the opportunity of expressing their deep sentiments of loyalty and patriotism," says Waddill Catchings, chairman of the National Chamber program, in a statement issued here, "and will give them the opportunity of making constructive suggestions to the Government. The ultimate result of crystallizing the thought of large numbers of business men and sending these men home in a spirit to be helpful to the Government must result in a leadership throughout the country which will make more effective our national energy in the prosecution of the war.

"And here is another phase of the meeting: It is frequently said business is on trial. The manner in which business acts to-day will determine the attitude of Government toward business for years to come. If business really is on trial, it should be heard. There should be a voice speaking for business, otherwise business is apt to be judged by those men who come forward because they are hurt by some action which is taken in Washington or because they desire to secure a contract. In the absence of some general gathering of business men to give expression to the broad thoughts and feelings of business men, business is apt to be judged solely from its selfish standpoint."

The important subject of the Government control of prices will be exhaustively discussed at the meeting, which will consider the propriety of requiring manufacturers to supply the Allies and the public at the same prices that are made to the Government. Business men throughout the country are manifesting the liveliest interest in this issue and the session set apart for its consideration will probably be the most notable of the convention. W. L. C.

The H. W. Johns-Manville Co., producing and distributing asbestos products, insulating materials, boiler coverings, electric supplies, power plant products, etc., has leased new quarters in St. Louis for its branch offices and will occupy a six-story building at Eleventh and Olive streets which will be remodeled at a cost of about $30,000 before occupancy. An engineering construction department will be maintained in the new offices.

The Berkeley-Jefferson Railroad Co., Martinsburg, W. Va., proposes to build about 35 miles of line to develop clay, limestone and iron lands.

Will Try Again to Adjust Pig Iron Rates

Many Complications Arise in Cases Before the Interstate Commerce Commission—Result of Attempt to Be Made in November Is a Subject of Speculation

WASHINGTON, Sept. 4.—The railroads, on or before Nov. 1, will make another effort to adjust rates on pig iron from the Birmingham district to New England, on routes by rail to South Atlantic ports, thence by water to Boston or Providence, and thence by rail to interior New England points. In a third supplemental report in the Sloss-Sheffield case, the Interstate Commerce Commission has changed its mind as to what would be a proper rail-and-water rate from Birmingham to Boston, using that port as a typical point. In its second supplemental report the commission said that $4.25 per ton would be a reasonable charge. In its latest report, just made public, it comes to the conclusion that the increased cost of living warrants an addition of 25 cents per ton to the rate of $4.25 which, under the order issued in connection with the second supplemental report, was to have become operative on Aug. 15.

But that is not all the commission has ordered. It has devised a scheme for making rail-water-and-rail rates from the Alabama furnaces to New England foundries. It decrees that the $4 50 per ton rate from Birmingham to Boston or Providence shall be the base. To construct the through charge to the interior foundry, 40 cents is added to cover the transfer from the boat to the railroad and for the rail haul from the port to the destination the New England carrier may add three-fourths of its local rate—if there is such a thing from the port to the furnace point. If not, then it is presumed that three-fourths of the sixth class will be taken for calculating the part of the rate for the rail haul away from the delivery port, pig iron being classed as a sixth rate commodity. Usually, however, it takes a specific rate something less than sixth class.

A Matter of Speculation

How much of a dislocation in the iron and steel industry this third attempt to adjust these rates will cause is a matter for speculation. The pig iron rate structure, throughout the territory east of the Mississippi and north of the Ohio and Potomac rivers, has been subjected to repeated shocks ever since the first ruling of the commission in the Sloss-Sheffield case, issued in the summer of 1914. Whatever disturbance results, however, will come on the heels of commotion caused by the commission's decisions in the 15 per cent and the export steel cases, followed by a supplement known as the Pollak Iron & Steel Co. complaint against the Baltimore & Ohio.

By reason of the decisions in the two cases and the supplement mentioned, the industry recently has been paying higher rates. On Aug. 20 there was a readjustment of the iron and steel rates from Buffalo, Pittsburgh and Erie groups to New England, with Boston as a typical point. The pig iron rate went up from $2.58 to $3.10 without any particular discussion and without specific notice to the trade generally. The traffic and tariff sharps knew the advance would be made when they had assimilated the commission's decision in the 15 per cent case.

History of Readjustment

The readjustment that has been going on since Aug. 20 is being made under special permission from the Interstate Commerce Commission issued Aug. 4, authorizing the advances to be made on five days' notice instead of the 30-day requirement established by the statute, but which may be modified by the commission "for good cause shown."

Authorizations in the 15 per cent case and requirements in the export steel (Pollak supplement) case constitute the "good cause" for the five-day permit. In the 15 per cent case the commission authorized the eastern railroads to advance their class rates by substantially 15 per cent. Specifically they were given permission to advance the New York-Chicago class rate scale. The first-class rate in that scale between the points mentioned is always used as the yard stick for measuring class rates and commodity rates based on class rates in the eastern territory. The authorization was to increase that yard stick rate from 78.8 cents per 100 lb. to 90 cents and every other rate made on that scale or basing thereon in the same degree.

But the commissioners personally know little about the intricacies of the tariffs in which are stated the rates affected by their decisions; hence many perplexities shared by shippers in all lines. In their 15 per cent decision they sharply told the railroads that their proposal to add 15 per cent to commodity rates was so obnoxious, because it would break long established relationships, that it could not be tolerated.

Chicago on a Plateau

They made that declaration, apparently oblivious of the fact that the class scale governs rates on iron and steel from Chicago to the East, while rates from Pittsburgh, Buffalo and Erie are published as specifics. The effect of their decision, therefore, was to put Chicago on a high plateau and to break the long-established relationship between Chicago and Pittsburgh and points in Ohio in the Youngstown district. The Ohio points of production, in order to compete with Pittsburgh, had to be made arbitraries of two or three cents over Pittsburgh, instead of specified percentages of the New York-Chicago scale.

Hence there was great satisfaction in Pittsburgh and Ohio when the commission said commodity rates should not be touched. It was short lived, because the commission came to the conclusion that it would not do to disrupt relationships simply because of the difference in method of stating rates. It decided, therefore, that the relationship between Chicago on the one hand and Pittsburgh, Buffalo, Erie and the Ohio points carrying arbitraries over Pittsburgh should be re-established.

That decision, in turn, was forced by the commission's determination in the Pollak complaint supplement to the export steel case. When carriers just a year ago decided there was no reason why export rates on iron and steel should be 33 per cent less than domestic rates, they appeared to have forgotten that years ago they had put Buffalo, Pittsburgh and Erie on a parity by giving them commodity rates to the east equal to the class rate from Erie to Philadelphia and that that caused a disruption of the domestic rates from Cincinnati and other producing points in southern and southwestern Ohio.

Pollak Steel Co. Objects

The Pollak Steel Co., however, had not forgotten. Therefore, at the hearings on the proposal of the railroads to bring export rates up to the domestic level, it objected on the ground that such equalization would put it relatively at as great a disadvantage on export shipments as it had been for years on domestic traffic. The big operators in the iron and steel industry made no objection to bringing the export rates up to the domestic level. They did object, however, to the Pollak people injecting the question of the relationship of domestic rates into the export case. Thereupon the Pollak company filed a formal complaint. The commission after careful deliberation decided that the point made by the complainants was well taken. In its decision in the export rate case it said the railroads might advance the export rates on condition that they would at the same time bring the rates from Pittsburgh up to the basis of 60 per cent of the New York-Chicago rate and give

Cincinnati rates 87 per cent of the New York-Chicago class rate scale.

The practical result, therefore, of the consent of the big operators to an advance in export rates was to remove the advantage which Pittsburgh, insofar as the New York-Chicago percentage system of stating rates is concerned, had over Cincinnati.

Advance in Export Rates

The commission's consent to advance the export rates was given last spring. Before the new tariff could be made effective the railroads began their demand for a 15 per cent increase to which the big iron and steel interests also consented, and the readjustment under the export case decision was delayed until after the railroads tried to put into effect the commission's authorization in the 15 per cent case. The permit of Aug. 4 to make the tariffs effective on five days' notice, was issued because the commission, prior to that time, had decided that it could not afford to disrupt relationships such as would result from a literal compliance with its report in the 15 per cent case.

It will be noticed that the advance on pig iron from Buffalo to Boston is more than 15 per cent. The excess over 15 per cent is the accretion to the rate resulting from the Pollak supplement to the export case. Accretions of that kind attach to rates from all the producing points which were the beneficiaries of the demand of the Pittsburgh steel interests, made about 1901, that they be given as low rates as Buffalo, which, being about equidistant from New York, Philadelphia and Baltimore, was given treatment by the New York Central equal to that given Erie by the Pennsylvania. Pittsburgh demanded rates as low as Buffalo—and got them, thereby being taken out of the percentage of the class scale system of making rates on iron and steel, which is now being restored because the Pollak people objected to a longer continuance of the preference to Pittsburgh and related points.

Effect of Various Cases

As showing the effect of the two cases and one supplement, it may be pointed out that the old rate on billets and blooms from Chicago to New York was $5.26 per gross ton; the new rate is $6, or something less than 15 per cent, which is in exact accord with the increase in the first-class rate from 78.8 cents to 90 cents per 100 lb. The old rate from Pittsburgh to New York on billets and blooms was $2.76 per gross ton; the new one is $3.20, or something more than 15 per cent. A straight 15 per cent advance would have produced a rate of $3.174 per ton. By removing the preference Pittsburgh had in the old adjustment the new rate runs up to $3.20 and conforms to the New York-Chicago class scale, which furnishes the yard stick, as hereinbefore mentioned.

Contrary to published statements, the adjustment was not caused by the amendment to the interstate commerce law, signed on Aug. 9. That amendment requires a railroad, before it files an advance, to explain what it is trying to do and to obtain permission from the commission to file the tariffs. No one has ever discovered any reason for such an amendment. Under the new rule the commission, after being notified by a railroad that it desires to file an increased rate, tells it to send in an explanation and it will receive permission, almost pro forma. W. L. C.

The Cleveland Cliffs Iron Co., Ishpeming, Mich., has awarded a contract to O. W. Rosenthal & Co., 80 East Jackson Boulevard, Chicago, for the erection of a hospital and infirmary building costing about $100,000 complete, at Ishpeming. The building will be of reinforced concrete and brick, 55 x 145 ft., four stories and basement, and contain about 100 beds. Plans were prepared by M. J. Sturm, architect, 116 South Michigan Avenue, Chicago. Previously noted.

The Graham Iron Furnace, Graham, Va., has been acquired by John B. Guernsey & Co., Roanoke. The new owners plan to remodel and improve the plant, effecting a daily capacity of 150 tons.

UNION NOT RECOGNIZED

Conditions of Settlement of Labor Dispute in Alabama Mines

WASHINGTON, Sept. 4.—The adjustment of several labor disputes recently brought about by Secretary of Labor Wilson reflects the position which the Government is taking in these controversies and furnishes a reasonably sound basis for negotiations between manufacturers handling Government work and their employees. The Secretary of Labor has devoted much time of late to the settlement of labor troubles and has borne a more or less active part in the adjustment of disputes in the Pennsylvania coal mines, affecting some 80,000 miners. He has also assisted in composing the so-called southeastern shopmen's dispute, affecting 42,000 mechanics, and within the past few days he has effected a settlement between the Alabama coal operators and 25,000 miners employed in that district, thereby averting a strike that would have had serious consequences. The secretary has also assisted in the effort to bring about an agreement between the Atlantic coast shipyard managers and their men and expresses confidence that the threatened general strike will be averted.

In bringing about an agreement between the Alabama coal operators and the miners, Secretary Wilson prepared an agreement which has just been accepted by both sides in which the attitude of the Labor Department with respect to the rights of both employers and employees during the war period is outlined. The keynote of this agreement is non-interference by the employers with the work of the unions in organizing their men, upon condition that there shall be no demand for the recognition of the unions. In view of the importance of this agreement as establishing a precedent for future official action, its text is here reproduced as follows:

1. That the miners recede from their demand for recognition of the union.

That the coal operators of Alabama recognize the rights of employees to join any union, labor organization, or society they may choose, and agree that they shall not be discriminated against in the distribution of work for having joined such organization, provided always that in their affiliation and in the conduct of the organization nothing is done to disturb the relation existing between employer and employee, by methods of intimidation or coercion, and provided that employees joining any organization recognize the right of each employee to join or not as he may individually decide, and also recognize the right of the company to insist that no employee shall use the company's time for any purpose other than that for which he is paid, and that he must not interfere with the operation of the mine, or knowingly do that which will reduce the output.

That they will upon application through the usual channels for employment, re-employ any man who has been discharged, if there be any, solely for joining the union, but will not obligate themselves to re-employ any man who has made unlawful threats or committed unlawful acts, unless the employer is satisfied that the same acts will not again be committed by the applicant.

2. That the right of the miners to place check weighmen on the tipples, to see that their coal is properly weighed and credited, should be fully recognized. The same to be elected and paid for by the miners without any interference, as per the laws of the State. All coal to be weighed and paid for as per standard weights, at all mines equipped with scales.

3. That semi-monthly pays should be established where they do not exist.

4. That the managers receive committees of their own workmen selected at meetings called for the purpose not oftener than every three months, to present any grievance that they may have to submit, which shall not include any matter herein waived or postponed. If they fail to arrive at a satisfactory adjustment of the grievance or grievances complained of, the same to be submitted to the Department of Labor for final adjustment. It being understood that a decision will be made within 30 days after submission.

It is further understood that any grievances arising must first be taken up by the individual or individuals affected with the foreman or officials having authority over such dispute and, they failing to agree, it shall be taken up through the committee as above provided.

5. The consideration of the hours of labor, relative prices of differentials, machine operations, local inequalities and uni-

formities, and the abolition of the contract system be indefinitely postponed.

This agreement was promptly accepted by both miners and operators, the latter stipulating merely that they would "abide by and observe said suggestions during the war or so long as their employees observed and abide by the above suggestions relating to them." It is understood that all the coal operators of Alabama, including those not involved in this dispute, will ratify this agreement during the present week.

News of Labor World

Members of the four local unions at Bridgeport, Conn., of the International Association of Machinists, at a meeting held Aug. 31, voted to approve a general strike to enforce demands for a new minimum wage scale. No time was set for the calling of a strike. The national officers of the organization were present and approved the plans of the local unions.

A strike of 25 pieceworkers at the Naugatuck Malleable Iron Works, Naugatuck, Conn., for increased wages has caused a shutdown of the plant for an indefinite period. The men have been receiving about 40 cents an hour and the new demands are equivalent to about 50 cents an hour.

The strike of the machinists at the Baush Machine Tool Co., Springfield, Mass., remains unsettled, and it is reported that trouble may occur in other local plants.

The child labor law is having a marked effect in many metal-working industries which have been taking on minors between 14 and 16 years old to replace the young men lost by the draft. In Bridgeport, Conn., nearly 1000 minors are without employment, as the manufacturers will not change their working hours to comply with the eight-hour requirement of the new law. Agent Charles N. Hall, Connecticut State Board of Education, is quoted as expressing the belief that the continuance of the war and the further drafting of young men will have a strong effect toward an increase of the eight-hour standard in factories, as the necessity for employing minors will become more of a factor in industry.

The Taft-Pierce Mfg. Co., Woonsocket, R. I., manufacturer of tools, gages and special machinery, has announced the inauguration of an eight-hour work day basis with time and one-half for overtime. There will be no change in rates or in the present working schedule, but minors between 14 and 16 years will not be allowed to work more than eight hours a day in compliance with the new Federal law. The company employs about 1000 hands.

More than 3000 members of the Federated Trades employed in the shops of the Boston & Maine Railroad are on strike following the refusal of a demand for an increase of 8 cents an hour. A proffer of 2 cents an hour increase made by the company was refused by the men and all attempts by Federal and State mediators to bring about a settlement have been futile. About 1300 men are out at Billerica, Mass., 600 at Concord, N. H., 75 at Springfield, Mass., 65 at Greenfield, Mass., 50 at Worcester, Mass., and many groups at Dover, N. H., and other points.

The Indianapolis branch of the National Metal Trades Association and the Associated Employers of Indianapolis have joined in promoting an extensive advertising campaign in the Central States for the purpose of obtaining labor for Indianapolis factories, particularly those engaged in Government work.

The Gorham & Goddard Tool Co., 45 W. Congress street, Detroit, Mich., will shortly begin the manufacture of milling cutters, in addition to its present line of salvage work in milling cutters.

The nickel ore output of New Caledonia in 1916 was 30,679 metric tons, according to the *Echo des Mines*. The output in 1915 was 48,576 tons, and in 1914 it was 94,154 tons.

The McIntosh, Seymour Co., A. C. Baldwin, manager, Auburn, N. Y., is having plans prepared for a factory and erecting building.

Book Reviews

Modern Machine Shop Construction, Equipment and Management. By Oscar E. Perrigo. Pages, 384, 6¾ x 9½ in.; illustrations, 219. Published by Norman W. Henley Publishing Co., New York, and for sale by THE IRON AGE book department. Price, $5.

The first edition of this book appeared in 1905, and gave a good and comprehensive account of shop methods of that time. Since that date there have been great advances in machine shop practice, and the author has added four new chapters to bring the book up to date. The headings of these chapters are: Increasing the Efficiency of Machines; Increasing the Efficiency of Men; Relation of the Overhead Burden to the Flat Cost; Manufacturing Cost Systems. These chapters deal largely with the problems that have arisen from intensive production in connection with scientific management and outline in a general way the methods of time study, routing, cost finding, etc., that have been developed under it.

The book as a whole is divided into three sections, dealing respectively with shop construction, shop equipment and shop management. The treatment is mainly descriptive, examples of the various problems which must be solved being given throughout the book. Apparently these have been drawn from the author's own engineering practice, and his method of solution in each case is worked out in considerable detail. The impression that one receives is that the book is intensely practical. In fact, one criticism that might be made of it is that it is too practical, as there is little or no underlying theory given showing the reason for the adoption of any particular method. The book, however, is a good one, as it outlines procedure which has succeeded, and its pages will contain many hints leading to the solution of shop problems that are not directly discussed in its pages. It is particularly good for the young engineer and student.

An outline of the several sections follows: Part one contains data on building construction, roofs, foundations, chimneys, floors, heating and ventilating, lighting and power transmission. Part two deals with the planning of shop buildings and the arrangement of buildings and equipment. It takes up the machine shop, tool room, store room, drafting room, pattern shop, foundry forge shop and the transportation equipment. Part three is devoted to management, cost systems, mutual aid societies and general efficiency.

The Unwritten History of Braddock's Field. Edited by George H. Lamb. Pages, 336, 7½ x 10¼ in.; illustrated.

This book has been written by the history committee appointed by the business men of Braddock, Pa., in connection with the celebration next year of the golden jubilee of Braddock, the silver jubilee of Rankin and the 175th anniversary of the first white settlement west of the Alleghenies. It gives a sketch of the early history of Braddock's field, seven miles from Pittsburgh, which was the farthest point west reached by the English army on its march toward Fort Duquesne. There it was attacked July 9, 1755, by the French and Indians, and driven back across the Monongahela River. George Washington, then 23 years old, fought in the battle as a subordinate under General Edward Braddock, who was wounded and died a few days later. A survey of industrial Braddock, including a history of the Edgar Thomson Steel Works, is contributed by Hugh P. Meese. The history of the great plant is traced through the administrations of Capt. William R. Jones, 1873 to 1889; Charles M. Schwab, 1889 to 1892; James Gayley, 1892 to 1895; Thomas Morrison, 1895 to 1903 and Charles E. Dinkey, 1903 to date. Some intimate inside stories are told of Captain Jones and other men prominent in the steel business at Braddock. Numerous half tone engravings of prominent citizens of the town and places of historic interest and of plants are included. Among those who obtained their early training in Braddock industries are James A. Farrell, president, and D. G. Kerr, vice-president United States Steel Corporation.

Machinery Markets and News of the Works

MORE PLANTS TO MAKE GUNS

Government to Enlarge Ordnance Program

General Vehicle Co. Issues Big List of Tools Needed for Airplane Engine Work—New Shipbuilding to Start Soon

Reports from various quarters indicate that the Government will expand its ordnance program to provide for the manufacture of a large number of guns, ranging from 3 in. to 9.5 in. Several new manufacturing projects, as yet rather indefinite, are under consideration. Meanwhile, concerns with which arrangements have already been made are actively preparing. The Tacony Ordnance Corporation has issued lists of 21 cranes and about 50 machine tools for its gun-forging and machining plant at Tacony, Pa. The Taylor-Wharton Iron & Steel Co. has purchased about $300,000 worth of machine tools and five cranes for gun-forging and rough machining at its Tioga plant, Philadelphia. The Standard Steel Works Co., Philadelphia, with plant at Burnham, Pa., is equipping additions to provide capacity for forging and rough machining 6-in. howitzers. Other gun-forging plants are also buying equipment. The Poole Engineering & Machine Co., Baltimore, is inquiring for equipment in anticipation of receiving a Government contract to turn out 4-in. guns. Another concern in Baltimore is considering a similar proposition. The destroyer program of the Navy Department will necessitate enlargement of shipbuilding plants, provision for the building of marine engines and other work that will doubtless involve purchases of machine tools.

Preparations of the Aircraft Production Board to build an immense airplane fleet are coming to light through the inquiries and purchases made by concerns which will build the engines. The General Vehicle Co., Long Island City, N. Y., last week sent out a list of about 900 machines, which will be bought as quickly as possible. The Trego Motors Corporation, New Haven, Conn, is buying a number of machine tools to provide for turning out five engines a day. The Simplex Automobile Co. list is still pending, but orders will be placed as soon as definite arrangements for manufacturing are made with the Government. The Fageol Co., Oakland, Cal., sent a representative to New York to sound out the machine-tool market, but whether orders will be placed soon has not developed. This company is busy on tractor and truck work, but may make aviation engines also. The Standard Aero Corporation, which bought a new plant at Elizabeth, N. J., is inquiring and will place orders for machine tools soon. The Duesenberg Motors Corporation has bought a few machines for its plant in Newark, N. J. The Willys-Overland Co. has been making additional purchases for its plant at Elyria, Ohio. The same company is equipping a plant in Canada.

It is expected that the American International Corporation and the Submarine Boat Corporation will soon place orders for equipment for ship-assembling yards, the Emergency Fleet Corporation having authorized them to go ahead on plants at Hog Island, near Philadelphia, and on the Newark Meadows. The Lackawanna Bridge Co. will co-operate with the Submarine Boat Corporation. The Merchants Shipbuilding Corporation, Philadelphia, has awarded a contract to the Edward F. Terry Mfg. Co., New York, for 24 overhead electric traveling cranes of 15-ton capacity for its yard at Bristol, Pa. The order aggregates about $1,125,000. The Federal Shipbuilding Co. is expected to issue additional lists this week covering cranes and other shop equipment it will buy for its new plant on the Hackensack Meadows. The Newport News Shipbuilding & Dry Dock Co., with offices in the Woolworth Building, New York, has issued another list of machine tools for its plant at Norfolk, Va. The Lake Torpedo Boat Co., Bridgeport, Conn., is buying for a project in which Simon Lake, the submarine inventor, is interested.

Other miscellaneous business in Eastern markets includes purchases for a large addition to the plant of the American Chain Co. at York, Pa., which are being made by A. C. Campbell, Inc., Waterbury, Conn. The W. J. Crouch Co., 253 Broadway, New York, is in the market for a list of machine tools for export. Walter Scott & Co., Plainfield, N. J., are still making purchases on their list issued a few weeks ago. This concern will make gun carriages for the Government. R. Hoe & Co., New York, are buying considerable new equipment.

The Pennsylvania Railroad Co. has about completed purchases for the Government locomotive shop to be built in France. Prompt delivery was required and many bidders were eliminated through inability to make early shipments. The entire crane order went to the Cleveland Crane & Engineering Co., Cleveland, Ohio. This company agreed to deliver the 18 cranes in 90 days. Shipment of the first cranes will be made 25 days after receipt of the order.

Government orders continue to feature buying in the Middle West. The Hampton Roads Shipbuilding & Dry Dock Co. has been organized in Cleveland and will shortly buy machines and cranes for a shipbuilding plant at Norfolk, Va. The Erie Forge Co., Erie, Pa., is inquiring in Cleveland for additional equipment for gun-forging work. The Defiance Machine Works, Defiance, Ohio, which is building plant additions, has bought about 20 machines. A concern in Erie, Pa., which will build airplane engines, is inquiring for machine tools. The Norfolk & Western Railroad Co. has placed orders with Cincinnati dealers for a number of lathes and other machine tools.

Reports from Canada indicate a decided falling off in the munitions industry there. Some plants have been dismantled and second-hand machinery has been thrown on the market. The Dominion Bridge Co., Montreal, Que., will go into the manufacture of marine engines on a very large scale in the near future.

New York

NEW YORK, Sept. 4.

Buying and prospective buying for airplane engine plants continued to feature the New York machine-tool market during the past week. The General Vehicle Co., Long Island City, N. Y., which has been working on Gnome engines for the British Government, startled the trade by issuing the biggest list that has yet come from any airplane concern, totaling about 900 machines. It is said that the purchases on this list, which are to be begun this week, will approximate $1,500,000 to $2,000,000. Deliveries by Nov. 1 are asked for in most instances. The Trego Motors Corporation, New Haven, Conn., has closed during the week for a number of machines and is preparing to turn out five engines a day. The Simplex Automobile Co. list is still pending, though it is said that buying may be begun at any moment. The list issued by the Inter-Continental Machinery Corporation, 165 Broadway, New York, which was mentioned last week, is understood to be partly in behalf of the General Vehicle Co. The Standard Aero Corporation, which will speedily equip its new plant at Elizabeth, N. J., is also inquiring and will place orders soon. A representative of the Fageol Motors Co., Oakland, Cal., has recently spent some time in New York and conferred with machine-tool dealers regarding equipment for that concern's plant, additions to which are being built. The Fageol company is busy on tractor and truck manufacturing, but, it is reported, may also make airplane engines. This company has been manufacturing the highest-priced pleasure automobile on the market, but is now devoting its energies almost entirely to other work. The Duesenberg Motors Corporation, 120 Broadway, New York, which is completing a new plant in Newark for the manufacture of airplane and marine engines, has been buying a few machines. The Willys-Overland Co. has placed orders for considerable equipment for its plant at Elyria, Ohio.

Walter Scott & Co., Plainfield, N. J., which has a gun-carriage contract, is still placing orders on its recent list of about 200 machines. The General Electric Co., Schenectady, N. Y., is still buying. R. Hoe & Co., New York, are placing orders and are believed to have a Government contract.

The W. J. Crouch Co., 253 Broadway, is in the market for a considerable quantity of machinery and machine tools for export.

The Newport News Shipbuilding & Dry Dock Co., with New York office in the Woolworth Building, has issued a new list of machine tools. The Lake Torpedo Boat Co., Bridgeport, Conn., is buying equipment for another project in which Simon Lake, the submarine boat inventor, is interested.

The Federal Shipbuilding Co. is expected to issue new lists at any time of equipment it will purchase for its shops at its new shipbuilding plant. A large number of cranes will be bought. The Submarine Boat Corporation is reported to have closed with the Emergency Fleet Corporation to build 28 ships on the Newark Meadows, and will have the co-operation of the Lackawanna Bridge Co. in this undertaking. The American International Corporation will build 200 ships at Hog Island, Delaware River, and the Chester Shipbuilding Co. and the Merchants' Shipbuilding Corporation together have a contract for 40 ships.

The Stamford Rolling Mills Co., 25 Broad Street, New York, operating plants at Stamford and Springdale, Conn., for the production of rolled plate and cast brass and copper, has increased its capital from $2,835,000 to $3.625,000.

The Concrete Fabricating Co., New York, has been incorporated with a capital of $60.000 to build steel and concrete barges and boats. W. S. Sawyer, J. T. Brady, and C. F. Bailey. 308 West Fifteenth Street, are the incorporators.

The Blacklock-Posner Tire Co., New York, has been incorporation with a capital of $15,000 to manufacture rubber and composition automobile tires. C. A. Weldon, H. H. Jacobson, and S. Bernheim, 35 Nassau Street, are the incorporators.

The Remington Typewriter Co., 374 Broadway, New York, has awarded a contract for the construction of a four-story addition, about 50 x 300 ft., to its works at Ilion, to cost about $30,000.

The T. P. Walls Tool & Supply Co., Inc., New York, has been incorporated with a capital of $50,000 to manufacture machinery, tools, etc. W. H. Lenk, A. Quinn, and T. P. Walls, 75 Walker Street, are the incorporators.

The Main Bale Ties Co., Inc., New York, has been incorporated with a capital of $25.000 to manufacture wire for binder service. The incorporators are V. G. Azra, A. Ragone, and J. P. Gaccione, 1569 East Thirteenth Street, Brooklyn.

The Long Island Railroad Co., Pennsylvania Terminal, New York, is planning for extensions and improvements in its shops on Atlantic Avenue, Morris Park, Long Island, to cost about $6,000.

The Lang Propeller Co. of America, Inc., New York, has been incorporated with a capital of $45,000 to manufacture aeroplanes, propellers, and other aircraft apparatus. L. L. Montant, A. A. G. Land, and B. N. Busch, 30 East Forty-second Street, are the incorporators.

The Davidson Pipe & Iron Corporation, Brooklyn, N. Y., has been incorporated with a capital of $10,000 to manufacture pipe, tubing and foundry supplies. E. Davidson, and C. and P. Devine, 66 Penn Street, Brooklyn, are the incorporators.

The Charles Ross & Son Co., 148 Classon Avenue, Brooklyn, N. Y., manufacturer of mixing and grinding machinery, has awarded a contract for the construction of a one-story brick addition, 50 x 85 ft., on Emerson Place, to cost about $8,000.

Corley, Williams & Dolan, Inc., New York, has been incorporated with a capital of $500 000 to manufacture machinery. D. J. Dolan, R. A. Corley, and H. D. Merchant, 149 Broadway, are the incorporators.

W. F. O'Keefe, E. E. Wright, and George G. Steigler, New York, have incorporated in Delaware the Sante Fe Motor Car Co., with capital of $1,000,000 to manufacture automobiles.

The W. F. Darby Co., Inc., New York, has been incorporated with a nominal capital of $5,000 to manufacture typewriters and writing machines E. K., J. F., and W. F Darby, Glendale, are the incorporators.

The Gore Aerocraft Corporation, Brooklyn, N. Y., has increased its capital from $250,000 to $3,000,000.

The Badgley & McCrary Co., New York, has been incorporated with an active capital of $10,000 to manufacture refrigerating and ice-making machinery. O. K. and T. J Badgley, and L. H. Miller, 61 Broadway, are the incorporators.

Arthur W. Britton, 65 Cedar Street, New York, and associates, have incorporated in Delaware the Continental Shipbuilding Corporation with capital of $1,200,000. John A. Moore, New York, is also interested.

The Bureau of Yards and Docks, Washington, D. C., is having plans prepared for the construction of new hydraulic plant additions to the structural and machine shops at the Navy Yard, Brooklyn, N. Y., to cost about $75,000.

The Multi-Life Tube & Rubber Co., Inc., New York, has been incorporated with a capital of $90.000 to manufacture rubber tires and tubes. C. B. Quick, C. W. Blanford, and I. D. Hamilton, 452 Fifty-sixth Street, Brooklyn, are the incorporators.

The Caledonia Bean Harvester Co., North Street, Caledonia, N. Y., manufacturer of harvesting machinery, has awarded a contract for improvements and extensions in its works, including a one-story assembling shop, about 30 x 114 ft., and the remodeling of its one-story foundry.

The Dilts Machine Co., 59-69 North First Street, Fulton, N. Y., manufacturer of paper and gate hoisting machinery, has had plans prepared for the construction of a new one-story hydroelectric power plant, about 20 x 35 ft., to cost $15,000. Frank Dilts is president.

The Tolhurst Machine Co., Sixth Avenue and Fulton Street, Troy, N. Y., manufacturer of machinery, has awarded a contract for the construction of a new one-story reinforced-concrete pattern shop and works building, about 40 x 60 ft., and 60 x 220 ft., respectively, at Green Island. C. H. Foster is president.

Fire, Aug. 30, destroyed the finishing plant of the Dovert Mfg. Co., Fifth Avenue and Sixteenth Street, Watervliet, N. Y., manufacturer of saddlery, hardware, etc., with loss estimated at about $55,000. The plant will be immediately rebuilt.

The Lockport & Ontario Power Co., Buffalo, will build an addition to its power plant, about 100 x 150 ft., at Lyons. R. A. Dyer is engineer.

The Curtiss Aeroplane Co., Churchill Street, Buffalo, has awarded a contract for the construction of new experimental works at Mineola, Long Island. The J. W. Cowper Co., Inc., Fidelity Building, Buffalo, is the contractor.

The school board, Buffalo, is arranging an appropriation of $27,000 for the installation of new machinery at the city vocational schools, including extensions required for the new equipment. At the Black Rock school, a new machine shop will be provided, including three engine lathes, drill press, tool grinders, and other machinery; new engine lathes will be installed at the Seneca school, as well as at the Elm vocational school. At this latter shop, new welding apparatus will be provided. A new machine shop and wood-working department will be arranged for School No. 17. Considerable equipment has been ordered. Edward D. Emerson is chairman of the board.

The American Ammunition Co., 25 Broad Street, New

York, will build a one-story brick addition to its works at Paulsboro, N. J., about 80 x 160 ft. Contract has been awarded.

The Standard Fuse Corporation, Paulsboro, N. J., has commenced the installation of new machinery at its works for the manufacture of cannon primers. The company is also planning for the erection of additions for the production of aeroplane parts.

The Eastern Tire & Equipment Co., Rutherford, N. J., has been organized to manufacture automobile tires. Rudolph H. Balzer, 22 Union Avenue, heads the company.

William Hauser, Bloomfield, N. J., and associates have incorporated in Delaware the Steelcrete Railroad Tie Co., with capital of $1,000,000 to manufacture steel and concrete railroad ties. George A. LeFevre, Richmond Hill, N. Y., is also an incorporator.

The Hyatt Roller Bearing Co., Middlesex Street, Harrison, N. J., has acquired a foundry building, about 100 x 175 ft., on Somerset Street, near Fourth Street, formerly occupied by Reuther Brothers, iron founders. It will be used as a works extension.

The F. & L. Mfg. Co., West Orange, N. J., has been organized to manufacture ash sifters, etc. Nathan Freedman, 588 Orange Street, Newark, heads the company.

The Pennsylvania Railroad Co., Pennsylvania Terminal, New York, has awarded a contract for the construction of new shop buildings at its Greenville Yards, Jersey City, N. J.

The Manhattan Electrical Supply Co., 45 Morris Street, Jersey City, N. J., manufacturer of electrical specialties, will make improvements and extensions in its plant to cost about $18,000.

The American Can Co., 120 Broadway, New York, has acquired a concrete factory building on Communipaw Avenue, Jersey City, N. J., fronting on the Lafayette Railroad, for a new plant.

The Asher Mfg. Co., Willimantic, Conn., manufacturer of laundry machinery, will erect a one-story plant, 60 x 208 ft., at 212 Colt Street, Irvington, Newark, N. J., to cost about $25,000.

The Oxford Mfg. Co., Newark, N. J., has been organized to operate a plant at 86 Frelinghuysen Avenue, for the production of automobile parts. William W. Schofield, 424 Belmont Avenue, heads the company.

The Gamon Meter Co., 282 South Street, Newark, manufacturer of water meters, will erect a two-story addition, about 31 x 85 ft., to cost $8,400.

The Crocker-Wheeler Co., Ampere, N. J., manufacturer of motors, generators and other electrical equipment, will erect a new five-story, reinforced-concrete plant, 100 x 200 ft., at Fourth Avenue and Twelfth Street, to cost about $163,000. The company has also acquired the plant of Edward Maher's Sons, iron founders, at 216 Berlin Street, Newark, and plans to improve and extend the works to increase the present capacity.

Bride & Tinckler, Newark, jewelry manufacturers, have filed notice of organization to operate their plant at 336 Mulberry Street. Charles C. Tinckler, 76 Maplewood Avenue, Maplewood, heads the company.

The Curtiss Aeroplane & Motors Corporation, Buffalo, is equipping its branch plant on the Niagara River for the manufacture of hydroplanes.

The Transcontinental Motor Truck Corporation, Buffalo, has been incorporated, with a capital stock of $1,250,000, by E. S. Stengel, R. A. Schmidt and P. J. Bloxham, to manufacture trucks, engines, motor boats, etc.

Ellis E. Lawton, Inc., Syracuse, has been organized with a capital stock of $25,000, to manufacture auto batteries and electrical and automobile supplies. E. E. Lawton, G. H. Beebe and L. S. Chapman, Syracuse, are the incorporators.

The American Brass Co. advises that it has no intention at present of building an addition to its Buffalo branch.

The Ross & Gade Co., Inc., 206 Canal Street, New York, has completed a new foundry and is specializing on work for pumps, valves, water filters, and brass and bronze fittings.

The Ericsson Mfg. Co., Buffalo, manufacturer of shop telephones, magnetos and other electric apparatus, has broken ground for an addition to its plant to increase its facilities for manufacturing the Berling magneto, for which a large demand has grown up for use on aeroplanes, automobiles and motor cycles.

The Pullman Co., Buffalo, has commenced work on additions to be made to its manufacturing and repair shops, at Broadway and the New York Central Railroad.

H. J. Gorke, Inc., Syracuse, has been incorporated with a capital stock of $50,000, to manufacture electrical goods, supplies, equipment, etc. H. J., K. S. and D. Gorke are the incorporators.

The Presto Machine Works, Inc., has taken new quarters at 124 and 130 Pearl Street, Brooklyn, N. Y., where it will have double its previous capacity for the production of gages and other tool room and contract work.

New England

BOSTON, Sept. 3.

The present record of plant additions and the formation of new corporations in New England is in marked contrast to that of one and two years ago when expansion was the rule in all the metal-working centers. The drop in new construction is not due, however, to a decline in the volume of business, for manufacturers in this section are working at the greatest capacity possible under the labor and transportation conditions. The draft has made itself felt among the skilled workers in many cities and will be a real factor in the production of munitions in Connecticut; so much so that the Connecticut Council of Defense has sent another protest to Washington, pointing out that the Government must quickly decide whether it most wants munitions or men from that State. A compilation of the results in 30 representative factories in Bridgeport and Fairfield County indicates that they will lose an average of 23 per cent of their skilled mechanics by the draft. This is due largely to the fact that the skilled men who rushed into this district last year and the year before, in response to the high wages offered, were the younger men who had no families to tie them to other places. The less skilled workers are for the most part aliens, which throws the burden of the draft upon the skilled element in the plants. A further increase in wages will be necessary to attract enough skilled men to replace those taken away, and this will probably cause a further demoralization of wage schedules in other sections, as was the case when the big Connecticut munitions plants were scouring the Eastern states for help in 1915 and 1916.

Changes in commodity rates on the Eastern railroads which have just been allowed will add to the cost of castings used in machine construction and the embargoes which have been such a drag upon industry for nearly two years are still a prominent factor in transportation of basic materials. The new rates affect aluminum, coal, coke, iron ore, pig iron, and iron and steel articles. The new rates on Southern iron from the Birmingham district are $4.60 per gross ton to Boston and Providence. To Springfield and Lowell, Mass., and Portland, Me., the rate is $4.50 per gross ton plus 40 cents per ton for handling at ports and 75 per cent of the present rate from the ports to the cities named. This amounts to an advance of about 25 cents per ton to Springfield or a total rate of $5.50 per ton. It is estimated that the advance will cost the Springfield foundries about $100 a day on the present volume of business.

There are a few strikes now on in machine tool plants, and meetings are being held in various cities that promise to lead to further demands that are almost sure to be resisted by manufacturers. About 3000 machinists, boilermakers and blacksmiths are on strike in the shops of the Boston & Maine Railroad and labor unrest is markedly on the increase generally.

The Worcester Machine Screw Co., Worcester, Mass., a branch of the Standard Screw Co., finding that it would take two years to secure equipment for the new factory which it proposed to build on land recently acquired on West Boylston Street, has decided to rush additions to its plant on Beacon Street. It will build a machine shop, 51 x 115 ft., three stories; a machine shop, 60 x 75 ft., one story; and a storage building, 42 x 45 ft., one story; all to be completed within 10 weeks. Additional equipment will be installed.

The Trumbull Electric Co., Plainville, Conn., electrical supplies, is building an addition, 50 x 100 ft., four stories, which will give it a total floor space of 110,000 sq. ft.

The Mystic Wire & Brass Works, Inc., 7 Water Street, Boston, has been incorporated with capital stock of $3,000 to succeed the Mystic Wire Works. The company has a factory at 135 Pierce Street, Malden, Mass. William H. Bibbey is president and Carl E. Nordblom, treasurer.

The additions under way at the Colt Patent Fire Arms Mfg. Co., Hartford, Conn., consist of two additional stories to a four-story building, 60 x 500 ft., and an additional story to a four-story building, 60 x 200 ft., with an ell, 23 x 50 ft.

The Spencer Specialties Co, Worcester, Mass., has been incorporated with capital stock of $50,000 by interests connected with the Spencer Wire Co., to manufacture metal products for use in musical instruments. George M. Thompson is president; Frank Kilmer, Worcester, treasurer; and Harry W. Goddard, president of the Spencer Wire Co., is a director.

The New Britain Tool Co., New Britain, Conn., is asking estimates on a factory, 50 x 100 ft., one story, which it contemplates building in the near future.

The Merrill Process Co., Boston, has been incorporated with authorized capital stock of $500,000 as machinery manufacturer and general contractor. The directors are Francis H. Swift, president; Fisher H. Nesmith, 84 State Street, Boston, treasurer; and A. G. Grant.

The Sullivan Machinery Co., Claremont, N. H., has awarded a contract for a factory, 80 x 121 ft., three stories, and for a three-story and a five-story addition to existing buildings.

The Colonial Brass Co., Middleboro, Mass., has been incorporated with authorized capital stock of $150,000 by John J. McCarthy, president; William B. Crossley, treasurer; and Gerard F. Shaw.

The Fuller Iron Works, West Exchange and Sabine Streets, Providence, R. I., is having plans drawn for an addition, 20 x 50 ft., one story, to be used as an annealing room.

The Wyman-Gordon Co., Worcester, Mass., has awarded a contract for a building, 36 x 40 ft., one story.

The H. & B. American Machine Co., Pawtucket, R. I., is to build a pattern storage building, 76 x 100 ft., two stories.

The Terry Steam Turbine Co., Windsor Street, Hartford, Conn., is planning to build an addition, 100 x 108 ft., one story, and an addition, 20 x 50 ft., two stories, to its office.

The Bullard Machine Tool Co., Bridgeport, Conn., has issued additional shares of stock to the amount of $110,000, making outstanding stock of $850,000.

The United Smelting & Aluminum Co., New Haven, Conn., has increased its capital stock to $400,000.

The American Chain Co., Bridgeport, Conn., is said to be planning for the establishment of a branch manufacturing plant near Norfolk, Va.

A two-story power house addition will be erected at the Northampton plant of the Nonotuck Silk Co., Florence, Mass.

The Standard Electric Time Co., Springfield, Mass., will build a three-story addition to its plant at 89 Logan Street, to cost about $25,000. H. V. Patterson, 187 Dunmoreland Avenue, is engineer.

Philadelphia

PHILADELPHIA, Sept. 4.

There are prospects of important industrial expansion in the Philadelphia territory as the result of efforts of the United States Government to increase ordnance production. A number of projects, as yet rather indefinite, are under consideration. The proposal of Secretary of the Navy Daniels to build 150 torpedo boat destroyers is of great interest to the machine-tool trade here, because it appears that many of these ships and their equipment of guns will be built at plants near by. Some of the guns will be shipped rough-bored to France and machined in plants in that country.

The Taylor-Wharton Iron & Steel Co. has purchased about $300,000 worth of equipment for forging and rough machining of guns at its Tioga plant, Philadelphia. The new equipment consists mainly of gun-boring and gun-turning lathes. Five cranes, two 10-ton, one 15-ton and two 20-ton, have been purchased from the Milwaukee Electric Crane & Mfg. Co. The Standard Steel Works Co., Philadelphia, has completed purchases of cranes and gun-boring and gun-turning lathes and planing machines for its plant at Burnham, Pa., where extensive additions are being completed to forge and rough-bore 6-in. howitzers.

The Tacony Ordnance Corporation has acquired a 22-acre site for its plant at Tacony, near Philadelphia, and has issued lists of about 50 machines and 21 cranes, which will be bought soon for turning out 9.5-in. guns. This company has the largest contract yet awarded by the Government for gun forgings, and will build its own open hearth furnaces. Purchases of hydraulic equipment will be concluded soon.

The Poole Engineering & Machine Co., Baltimore, is inquiring for equipment in anticipation of receiving a contract from the Government to machine 4-in. guns. This company only recently closed a contract with the Government for 700,000 1-lb. projectiles, as previously mentioned. Another Baltimore concern is also said to be expecting a similar gun contract.

The Pennsylvania Railroad Co.'s purchasing department is said to have closed for practically all of the equipment required for locomotive shops in France to be built for the United States Government. Quick deliveries were required, and many concerns were eliminated in the bidding, through inability to furnish machines within the time specified unless tools needed for other equally important Government work were commandeered. It is understood that the Niles-Bement Pond Co., Manning, Maxwell, Moore, Inc., the Gisholt Machine Co. and the Warner & Swasey Co. received a large share of the orders. It is now learned that the entire crane order went to the Cleveland Crane & Engineering Co., Cleveland, which agreed to complete the contract for 18 cranes in approximately 90 days. Shipment of the first cranes will be made Sept. 15, or 25 days after receipt of the order. Several of the cranes are of 65-ton capacity and 80-ft. span. In view of the congested condition of the raw material market, the Cleveland company will achieve a remarkable record in delivering these cranes within the time specified.

Shipbuilding will shortly take on a boom in the Philadelphia territory, the American International Corporation now having formally completed its contract with the Emergency Fleet Corporation to build 200 ships on Hog Island. It is said that 50 shipways will be built, and the corporation is expected to come into the market at once for cranes and other equipment. The Merchants' Shipbuilding Corporation, Bristol, Pa., which is an affiliation of the Chester Shipbuilding Co., with offices in the Finance Building, Philadelphia, has closed with the Edward F. Terry Mfg. Co., Grand Central Terminal, New York, for 24 overhead electric cranes of 15-ton capacity. The order amounts to about $1,125,000, which is a record size crane order. This concern will build 40 ships for the Government. Deliveries will be made within four months. The New Jersey Shipbuilding Co., associated with the Pennsylvania Shipbuilding Co. and the Pusey & Jones Co., with offices in the Land Title Building, has been making purchases for its new plant at Gloucester, N. J. The extent of the destroyer-building program of the Navy Department is indicated by the fact that the William Cramp & Sons Ship & Engine Building Co., Philadelphia, has contracts for 23 of these vessels and construction work will be rushed. The Cramp shipyard is in the market for five cranes to assist in this work.

The American Chain Co. will more than double the capacity of its York, Pa., plant. A new building, 70 x 420 ft., is being erected. Purchases of equipment are being made by A. C. Campbell, Inc., Waterbury, Conn. F. C. Yeates, 1325 Chestnut Street, Philadelphia, is purchasing for the new machine shop which the Midvale Steel Co. will build at Nicetown, Pa. The Standard Fuse Corporation at Paulsboro, N. J., will resume operations, it is reported, and several additional buildings will be erected. The concern will make airplane parts, a contract having been already received, according to report. The Frankford Arsenal will build a new shell plant, as well as the fuse plant, mention of which was made last week, though matters are said to be still in a rather indefinite state. The Westinghouse Electric & Mfg. Co. is installing new equipment in its new plant at Lester, Pa., and is reported to be still buying. This plant will make turbines for the United States Government. The De Laval Steam Turbine Co. is building an addition at its Trenton, N. J., plant and will need additional equipment. The Autocar Co., Ardmore, Pa., will buy some new machine tools for additions to its plant.

The Merchant Shipbuilding Corporation, Finance Building, Philadelphia, operated by the same interests conducting the Chester Shipbuilding Co., Chester, Pa., is making rapid progress in the construction of its new shipbuilding plant at Bristol, Pa., heretofore announced as being built under the direction of the Chester company. The plant will be equipped to construct 40 fabricated steel freighters, each of 9000 tons capacity, contract for which has been received. Extensions are under way at the Chester works to provide for increased capacity to handle recent orders. W. T. Thomas is general manager; Charles P. M. Jack is consulting engineer.

The Tacony Steel Co., Milnor and Bleigh Streets, Philadelphia, has had plans prepared for an addition to its plant for the manufacture of munitions. The company is said to be planning for the immediate construction of the proposed new forging plant to be operated by its subsidiary, the Tacony Ordnance Corporation, recently organized.

The Pearce-Arrow Tire & Rubber Co., 932 North Broad Street, Philadelphia, a Delaware incorporation, has increased its capital from $500,000 to $1,000,000. Notice has also been

filed of the change of name to the Pearce Rubber Corporation. The company is having plans prepared for the erection of a new two-story plant at Twenty-first and Lippincott streets, to cost about $150,000. J. Osborn Hunt, 114 Montgomery Street, Trenton, N. J., is architect.

F. R. Hansell, Philadelphia, and associates, have recently incorporated in Delaware the Talking Machine Sales Corporation with capital of $50,000 to manufacture talking machines, etc. S. C. Seymour, Camden, N. J., is also an incorporator.

The Philadelphia Drying Machine Co., Philadelphia, will build a new one-story power house addition to its plant at Stokely Street.

The General Pressed Metal Co., American and Diamond streets, Philadelphia, manufacturer of stamped metal specialties, has acquired a new factory at 1524-28 North Hancock Street, as an addition to its plant.

The American Steel & Wire Co., Hamilton Avenue, Trenton, N. J., has awarded a contract for the construction of its proposed new machine shop and wire rope mill on South Broad Street, at a cost of about $50,000. The structures will be 50 x 70 ft., and 100 x 310 ft., respectively. The J. H. Morris Co., Trenton, is the contractor.

The Department of Public Property, Camden, N. J., has awarded a contract for the construction of a one-story machine shop, about 38 x 110 ft., at Fifth and Arch streets, for municipal work.

The Stanton & Lewis Forge Co., Camden, N. J., will build a one-story brick addition to its foundry at German and Everett streets.

The Sun Shipbuilding Co., Chester, Pa., has awarded a contract to Barclay White & Co., 1530 Chestnut Street, Philadelphia, for the erection of two one-story additions to its plant, about 50 x 95 ft., and 26 x 83 ft., to cost $10,000.

The American Car & Foundry Co., Milton, Pa., is planning for the construction of additions to its local plant, including the installation of new machinery. Improvements will also be made in working conditions, including drinking fountains, lockers, etc., to cost about $30,000. The company is making rapid progress in the erection of an addition to its works at Berwick to provide for the installation of new machinery.

The Danville Structural Tube Co., 603 East Market Street, Danville, Pa., manufacturer of rolled pipes, tubing, etc., has completed the installation of a new machine shop. The company has also installed a new tube rolling single turn system, employing three furnaces instead of two as heretofore.

W. H. Nicholson & Co., 12 Oregon Street, Wilkes-Barre, Pa., manufacturer of machine tools, etc., has awarded a contract for the construction of a new one-story machine shop, about 50 x 120 ft., to cost about $15,000.

The La Lance & Grosjean Mfg. Co., Division Street, Harrisburg, Pa., manufacturer galvanized and enameled ware products, is said to be planning for the operation of an additional mill to increase its capacity.

Baltimore

BALTIMORE, MD., Sept. 4.

The Hall Steamship Co., Washington, has been incorporated in Delaware with a capital of $500,000 to operate a shipbuilding works. Madison Hall, C. N. Riker and S. W. Harrington, Washington, are the incorporators.

The Bureau of Yards & Docks, Washington, is preparing plans for a new five-story pattern shop, six-story machine shop, steel forging works and brass foundry, with other structures, to be erected at the Navy Yards on the Atlantic Coast. F. R. Harris is chief of the bureau.

The Baltimore Buggy Top Co., 107 Mount Royal Avenue, Baltimore, is arranging revised plans for its proposed new two-story reinforced-concrete plant, about 75 x 120 ft. Clyde N. Friz, Munsey Building, is the architect.

The Safety Sales Co., Lexington Street Building, Baltimore, is planning for the establishment of a new tin and metal-working plant near Lingo City, N. C. It will specialize in the production of cans and allied products.

The Bethlehem Steel Co., Bethlehem, Pa., is having plans prepared for a one-story addition, 60 x 250 ft., to its works at Sparrows Point, Md.

The American Shipbuilding Co., Richmond, Va., is said to be planning for the construction of a steel fabricating works for ship construction in connection with its proposed new shipbuilding plant. The headquarters of the company are at 11 Broadway, New York. S. H. Brown is president.

The Naul Shipbuilding Co., Wilmington, N. C., recently incorporated with a capital of $125,000, has acquired a site on the Northeast River for its proposed new shipbuilding works. A. P. S. Naul heads the company.

Chicago

CHICAGO, Sept. 4.

Small tools have begun to move in good volume in this territory, the bulk of the deliveries being to miscellaneous industries. The Government is more active in its purchases made through Washington, although up to the present time it has been calling chiefly for small tools, such as drilling and hand-milling machines, etc. Within the next few weeks a rush of war buying is expected which will put activity here more in line with that prevailing in the East. Existing plants now on war work have been adding to their equipment. Representatives of Ohio tool builders have been shipping some of their stock to Eastern points to facilitate deliveries. Despite the absence of orders, which are sensational in point of size, some of the local dealers, in the month just closed, did the best business in their history.

The Minneapolis Steel & Machinery Co., Minneapolis, Minn., has taken a Government order for 2000 6-in. shells, but will not be in the market for many tools as it finished a similar order for British shells last spring. Since that time it has converted its munitions shop into an assembly room for its tractors, and it will therefore build a shop, 132 x 432 ft., to cost $15,000 in which it will machine shells to fill the order. It also has contracts for steam hoists for ships, and expects more as the Government shipbuilding program advances.

The Government is purchasing a vast amount of army supplies such as foodstuffs, wearing apparel, etc., in Chicago and the Central West, all of which will have an indirect bearing on the demand for metal-working machines. When this indirect demand fully develops it will have to be cared for largely with second-hand machines, for the reason that manufacturers of guns and shells will be given priority; in fact, that is being done at present. The War Department will expend between $200,000 and $300,000 in the construction of warehouses at what formerly was the Hawthorne race track, Chicago. It is understood that three long brick buildings will be erected.

L. G. Hallberg & Co., architects, 116 South Michigan Avenue, Chicago, are preparing plans for a three-story reinforced concrete factory, 50 x 320 ft., for the Wall & Rentschler Tractor Co., Hamilton, Ohio.

The Union Special Machine Co., H. A. North, president, 300 West Kinzie Street, Chicago, is having plans prepared for an eight-story reinforced concrete factory, 100 x 100 ft., to cost about $125,000.

Bids have been taken on a one-story foundry, 60 x 120 ft., for the Monighan Foundry Co., 2123 Carroll Avenue, Chicago, to be of mill construction with steel trusses.

It is announced that the Rustler Mfg. Co., Piqua, Ohio, maker of sugar beet harvesting machinery, will locate in Freeport, Ill., occupying a building formerly used by the Stover Motor Car Co.

The Harrington & King Perforating Co., 616 North Union Avenue, Chicago, will build a one and two-story building, 400 ft. in length, for factory purposes, and to cost about $100,000 on the half block between West Taylor and Arlington Streets, and South Campbell Street and the B. & O. Railroad tracks, Chicago. The land has just been purchased from the Hurley Machine Co., which bought the site for building purposes, but decided to build elsewhere.

It is reported that the extensions to be made by the Gary Screw & Bolt Co., Gary, Ind., will cost more than $250,000, instead of $100,000, as previously reported. Several new buildings will be erected.

The Illinois Silo & Tractor Co., Bloomington, Ill., has started the construction of a one and two-story factory, 120 x 220 ft., the one-story portion having a roof of saw-tooth construction. A tractor cultivator will be manufactured.

The Galesburg Machine Works, Galesburg, Ill., will occupy space in a two-story and basement garage, 115 x 132 ft., to be constructed in that city by Peterson Brothers at a cost of $55,000. The building will also be used for a taxicab service and automobile salesroom.

The Landover Auto Truck Co., 343 South Dearborn Street, Chicago, is raising a fund of $25,000 for the manufacture of the Landover truck. A preliminary fund of $250,000 has already been raised.

The Albert Lea Sprayer Co., 309 West Main Street, Minneapolis, Minn., manufacturer of sprayers, bucket and barrel pumps, whitewashing machines, etc., has purchased a site and will erect a three-story and basement factory, 54 x 110 ft.

The Waterloo Gas Engine Co., Waterloo, Iowa, contemplates building a new foundry, 150 x 600 ft., and making other improvements which will cost about $200,000. Grading operations are in progress, and work will be started this fall if possible.

The Iowa Can Co., Davenport, Iowa, has been incorporated with a capital stock of $100,000 to manufacture cans and containers of metal and other materials. C. M. Rich is president, Charles Shuler, treasurer, and D. R. Lane, secretary.

Sales of the Howe detachable tongue truck reported in the last few weeks by the Abell-Howe Co., Chicago, aggregate some 250 trucks. The orders were largely for the complete equipment of plants, including those of the Saginaw Malleable Iron Co., Chicago Malleable Iron Co., American Radiator Co., Buffalo plant, and the Rockford Malleable Iron Co.

The Torcrete Shipbuilding Co., Chicago, recently organized, is said to be negotiating for a site near Detroit, Mich., for a new shipbuilding plant to specialize in the construction of cargo steamships.

The Union Special Machine Co., West Kinzie Street, Chicago, is having plans prepared for a new eight-story plant. H. A. North is president.

The Peoria Malleable Casting Co., Peoria, Ill., has awarded a contract for the erection of a one-story addition to its plant, about 500 x 1200 ft. L. E. Robey is president.

Milwaukee

MILWAUKEE, WIS., Sept. 3.

Industrial expansion continues at an unprecedented rate in all metal-working centers in Wisconsin. While some of the new work is due to demands from private sources, the bulk is for the enormous requirements of the Government. Various industries are undergoing a rapid readjustment from a private to a war supply business, and a great demand has arisen for machine-tools. Local tool builders continue to book orders at a rate that never before was known, in spite of the fact that on ordinary machines delivery cannot be made for eight to nine months, excepting on bookings where Government orders have priority.

The scrap metal business in this State has grown to enormous proportions the past six months, and not only are dealers building large warehouse and shipping facilities, but many new companies are entering the field. The entire northwestern territory is being combed by these dealers, and middle western foundries are being supplied in large volume. The search for scrap extends to the farms, where every piece of metal that has been accumulating for years is being gathered for remelting.

The Cruiser Motor Car Co., Madison, Wis., incorporated under the laws of Maine with a capital stock of $250,000 will erect a plant for the manufacture of an automobile which may be converted from a roadster or touring car into a complete outing or camping outfit. The officers are: President, W. D. Curtis, Madison; vice-president and general manager, Winthrop J. Burdick, Chicago; secretary, Dwight S. Bobb, Chicago; treasurer, George C. Riley, Madison. Mr. Burdick was formerly treasurer and sales manager of the New Era Engineering Co., and Mr. Bobb is a member of Adams, Crews, Bobb & Westcott, financial and corporation lawyers. The directorate includes C. A. Schimberg and E. J. Haines, Chicago, who will be sales managers. About $100,000 will be invested in buildings and equipment.

The Racine Auto Tire Co., Racine, Wis., has purchased the group of factory buildings at State and Marquette streets, formerly occupied by the Fish Brothers Wagon Company, and is remodeling the plant into a tire and rubber goods factory, which will employ between 500 and 600 operatives and afford an area of 250,000 sq. ft. The company last fall purchased about 14 acres, and had completed plans for the erection of a new plant costing $150,000 or more, when it was enabled to purchase the Fish wagon works from the present owner at a price said to be $200,000. So far as can be learned the new construction scheme will now be postponed indefinitely. L. J. Elliott is president and general manager.

The Jorgensen Mfg. Co., Waupaca, Wis., has been incorporated with a capital stock of $75,000 to manufacture machinery, tools, etc. The incorporators are P. J. Jorgensen, A. K. Jorgensen and C. H. Jorgensen.

The Hayes Machine Co., Oshkosh, Wis., which decided to devote most of its attention to the production of automobile axles, gears, transmissions, etc., several months ago, is reported to be preparing to move its plant and offices to Grand Rapids, Mich. It is stated that the company is being reorganized under the name of the E. B. Hayes Axle Co., with a capital stock of $500,000 and that a plant is now being completed for occupancy.

The Globe Seamless Steel Tubes Co., Milwaukee, has awarded the general contract for the erection of a brick and steel shop addition, 50 x 500 ft., one story. This is part of the enlargement scheme which will increase the capacity of the plant from 40 to 50 per cent. F. J. O'Brien is general manager.

The Milwaukee Motor & Supply Co., 720 Merchants & Manufacturers' Bank Building, Milwaukee, will remodel the building on Second Avenue, near Canal Street, into a factory and office building.

The West Bend, Wis., Aluminum Co., West Bend, Wis., has awarded contracts for the erection of a three-story ell-shaped addition, 72 x 190 ft., and a one-story auxiliary building, 50 x 60 ft., to the Federal Engineering Co., 218 Stephenson Building, Milwaukee. The additional facilities will enable the company to increase its production 75 to 100 per cent.

The Challoner Co., Oshkosh, Wis., manufacturer of sawmill machinery and general mill and factory equipment, is dismantling its foundry and turning it into a plant for the manufacture of anti-skid devices. Henceforth the company will devote most of its attention to horseshoe and anti-skid tire chains. George S. Everhart is vice-president and general manager.

The Steiner Mfg. Co., Plymouth, Wis., manufacturer of stationary and portable gasoline and oil engines, has been reorganized as the Plymouth Motor Mfg. Co. and the number of directors increased from five to seven. Its production will be enlarged at once.

The Townsend Mfg. Co., Janesville, Wis., has been incorporated with a capital stock of $125,000 to succeed to the business of Townsend Brothers, who established a plant about 18 months ago for the manufacture of tractors, farm implements and power agricultural tools and machinery. The incorporators are R. C., G. E. and R. B. Townsend.

The Burlington, Wis., Motor Truck Co., Burlington, Wis., organized recently with a capital stock of $50,000, has leased manufacturing quarters and will build 600 commercial car units for attachment to Ford chassis by Jan. 1, 1918. The design employs the Torbensen internal gear drive rear axle. A Chicago office has been opened at 160 West Jackson Boulevard.

The Hydro-Hoist Co., Milwaukee, has been incorporated with a capital stock of $25,000 by Frank A. Tuschen, Cornelius Wolf and Albert Heinemann to manufacture hydraulic hoists.

The Arrow Fuse & Mfg. Co., 2416 North Avenue, Milwaukee, has changed its corporate style to Trisco Fuse & Mfg. Co., and increased its capital stock from $35,000 to $45,000.

M. E. Vierheilig, architect, 764 Thirty-second Avenue, Milwaukee, has plans in process for a two-story factory costing about $25,000. The owner and location are withheld for the present.

The Northern Furniture Co., Sheboygan, Wis., is taking bids until Sept. 15 for the construction of a six-story addition, of brick and reinforced concrete, costing about $75,000. W. C. Weeks is the architect.

The Davis Mfg. Co., Milwaukee, manufacturer of gasoline and oil engines, has awarded a contract for the erection of a new core building, 92 x 100 ft., of reinforced concrete and brick.

The board of industrial education, Fond du Lac, Wis., has purchased a building which it will remodel into a central continuation school. Manual training equipment will be purchased.

The Universal Motor Co., Oshkosh, Wis., has increased its capital stock from $25,000 to $50,000 and intends to double its output of electric lighting units designed especially for army field service. Louis J. Monahan is president.

The Benson Speed Signal Co., Madison, Wis., has been incorporated with a capital stock of $100,000 to manufacture signal devices for automobiles, motor boats, railroads, vessels, etc. The incorporators are Hal Martin, A. D. Campbell and Louis Weidenback.

Detroit

DETROIT, Sept. 3.

Conditions in the machine-tool market remain about stationary with the expansion of the aeroplane motor industry holding the center of attention. Government orders for motor trucks have given unusual stimulus to the motor car trade in general.

The Chalmers Motor Corporation, Detroit, has leased its plant to the Maxwell Motor Co. for five years to enable the working off of a large supply of materials. The Chalmers company proposes to issue $3,150,000 first mortgage notes to meet old obligations.

The Olds Motor Works, Lansing, Mich., is increasing its floor space four acres by the erection of new buildings costing $400,000.

Alterations are being made to the plant of the Saginaw Auto Body Co.

Manager Charles F. Drozeski announced that the Saginaw Malleable Iron Co. will be ready for operation the first week in September. Shipments of materials have held back operations.

The Riverside Machine & Plating Co., Jackson, Mich., has changed its name to the Riverside Machine Co.

The Valley City Machine Co., Grand Rapids, has purchased the plant of the Sintz Gas Engine Co.

A six-acre factory site on the Detroit Terminal Railroad has been purchased by the Gray Motor Co., manufacturer of gas engines. Three buildings are being erected, of which the machine shop, 64 by 256, is now nearing completion. Machinery is being purchased for a production of 50 engines a day.

The Anderson Forge & Machine Co., Detroit, is making alterations to its plant.

The Marshall Blow Pipe Co., Detroit, manufacturer of dust-collecting machinery, is erecting a new plant.

The Manistee Shipbuilding Co., Manistee, Mich., will begin operations Oct. 1. An order for $60,000 worth of machinery has been placed for delivery this month.

The Lakey Foundry & Machine Co., Muskegon, is building an addition to its plant to triple its capacity.

Novo Engine Co., Lansing, has increased its capital from $112,000 to $675,000.

The Gas Oil Stove Co., Detroit, has increased its capital from $100,000 to $200,000.

The Valley City Machine Works, Grand Rapids, Mich., is building a two-story addition to cost $2,000.

The Air-O-Flex Automobile Corporation has been incorporated for $2,500,000 to manufacture trucks equipped with suspension cylinders in place of springs. G. M. Walker is president.

The Muskegon Engine Co., Muskegon, Mich., will begin the production of 2-ton trucks Oct. 1.

The Victor Wire Wheel Co., Kalamazoo, Mich., has been organized with a capital of $500,000 to manufacture motor car parts and aeroplanes.

Organization of the Lincoln Motor Co., Detroit, with capital stock of $500,000, to manufacture aeroplane engines for the Government has been completed by Henry M. and Wilfred C. Leland, former president and general manager, respectively, of the Cadillac Motor Car Co., Detroit. The company has acquired several acres embracing the buildings formerly occupied by the Rands Mfg. Co., to which additions are being made. Machinery is being installed and 100 men will be employed with the prospect of this number being increased to 2000. Production will start with 20 engines and gradually work up to 100. The completed machines will be shipped to France as fast as turned out.

Associated with the company are W. H. Murphy, Joseph Boyer, John Trix, George H. Layng, W. Rex Johnston, A. U. Widman, Ernest E. Sweet, Le Roi J. Williams, D. T. Randall, J. Wilbur Brown, M. W. H. Wilson and other motor car engineering experts.

Plans are being prepared for a machine-shop extension, 65 x 75 ft. for the Duplex Motor Co., Lansing, Mich.

The Benton Harbor Auto Machine Co., Benton Harbor, Mich., has been incorporated with a capital stock of $175,000 to take over the business of the Morrill & Morley Mfg. Co., and the Electric Specialties Mfg. Co. J. M. Klock is president, and R. C. Eisley, manager.

The Muskegon Engine Co., Muskegon, Mich., has let the contract for a factory, 75 x 160 ft., to cost $25,000, for the manufacture of a 2-ton commercial truck, and by Oct. 1 it expects to be producing at the rate of 25 trucks a month. The company has a capital stock of $150,000.

The C. R. Wilson Body Co., Detroit, Mich., has partially completed a new wood-working plant at Bay City, Mich., for the manufacture of automobile bodies. It will be at full operation Sept. 15 and will largely increase the capacity of the company's assembly plants.

Cleveland

CLEVELAND, Sept. 4.

Business in machine tools was heavy the past week, although no large new lists came out. Buying is almost wholly for Government work, the greater part at present being for shell and gun work. Some machine tool builders are unable to give preference any longer to orders for machines for Government work, as early deliveries on one machine would set back the shipment on a machine going to another customer with a Government order. On inquiry for two milling machines, an eastern manufacturer was unable to promise shipments until next June. A large amount of inquiry is pending for machines for making airplanes and airplane parts, but the placing of orders is held up until Government airplane contracts are placed. The Defiance Machine Works, Defiance, Ohio, which is building a large addition to its plant, placed orders the past week for 20 to 30 machines. The Hampton Roads Shipbuilding & Dry Dock Co., Citizens Building, Cleveland, will shortly purchase about 40 machines for shipbuilding and a number of cranes for a large plant to be erected at Norfolk, Va. The Erie Forge Co., which recently purchased considerable equipment for plant extensions and which has orders for a large amount of gun forging work, is planning further extensions to its plant and is inquiring for additional machinery.

The demand for turret lathes has so far not been greatly stimulated by Government requirements, owing doubtless to the large number of lathes used in the manufacture of shells for the Allies, contracts for which were mostly completed about the time our Government entered the war. Very few boring or turning machines have been purchased for work on 3-in. shells for the Government. A large amount of second-hand machinery is being thrown on the market by Canadian plants, presumably by companies that have not secured additional munition contracts.

The Hampton Roads Shipbuilding & Dry Dock Co., Norfolk, Va., has been organized by Cleveland men, with a capital stock of $1,000,000, to erect a shipbuilding plant at Norfolk. Gaylord W. Feaga is president, J. D. Carey, vice-president, and J. T. Sweeney, secretary and treasurer. The company is at present working on the details for its plant, which it is stated will be of large capacity. It will shortly be in the market for shipbuilding equipment, including machine tools and cranes. The present headquarters are at the offices of the Gaylord W. Feaga Co., Citizens Building, Cleveland.

The Glenn L. Martin Co., Cleveland, has been organized with a capital stock of $2,000,000 to build a plant to manufacture airplanes. G. L. Martin, formerly vice-president of the Wright & Martin Aircraft Co., New York, will be general manager and vice-president. Charles E. Thompson, president Steel Products Co., Cleveland, is president.

The Cleveland Switchboard Co. will erect a new factory, one-story, 80 x 140 ft., at 2925 East Seventy-ninth Street, Cleveland.

The Burdett Oxygen Co. has leased a building at Lakeside Avenue and East Thirty-third Street, Cleveland, in which it will establish a plant for the production of oxygen for factory purposes.

The United States Tool Co., which recently acquired a site for a plant at 3140 West 106th Street, Cleveland, will build a brick factory, 60 x 200 ft.

The Fulton Foundry & Machine Co., Cleveland, has increased its capital stock from $50,000 to $200,000.

The Barger Sheet Metal Co., Cleveland, has been incorporated with a capital stock of $10,000 by Sterling Parks and others.

The Grabler Mfg. Co., Cleveland, maker of pipe fittings and other products, will erect an addition, 66 x 104 ft.

The Benoist Airplane Co., Canton, Ohio, which has been incorporated with a capital stock of $500,000, has an option on a factory site for the erection of a plant. It is reported that the company has not definitely decided whether to erect its plant in Canton or in Sandusky, Ohio, where it is now located in the plant of the Roberts Motor Co. It is stated that plans are being considered for the erection of two steel buildings, each 100 x 300 ft.

The Sunbury Mfg. Co., Sunbury, Ohio, maker of handling equipment, will build a new one-story factory, 70 x 120 ft. Some additional equipment is being purchased.

The Wapakoneta Mfg. Co., Wapakoneta, Ohio, recently organized to manufacture automobile accessories, plans the erection of a plant, 50 x 75 ft.

The White Motor Co., Cleveland, has nearly completed a machine shop addition, 120 x 500 ft., at a cost of $300,000.

The Defiance Machine Works, Defiance, Ohio, is expanding to twice its present size and is advertising for 200 to 300 skilled mechanics. In addition to being rushed with orders for their regular line of tools the company has been awarded a large Government contract which necessitates the erection of additional buildings. It has purchased two adjoining blocks of land and construction work is under way.

The Turnbull Wagon Co., Defiance, has been taken over by a new organization, headed by W. O. Allen, Fostoria, Ohio, with a capital of $1,000,000. Motor trucks will be manufactured.

The Defiance Screw Machine Products Co., Defiance, has started operations on an extension that will double its capacity, and employ more men.

Indianapolis

INDIANAPOLIS, Sept. 3.

The Marsh Mfg. Co., Vincennes, Ind., has been incorporated with $25,000 capital stock to manufacture metal and wood products. The directors are Harry B., E. L. and John R. Marsh. The company has a $1,000,000 Government contract and is completing the equipment of a plant.

The Luther Roller-Shovel Co., Indianapolis, has been incorporated with $25,000 capital stock to manufacture shovels and machinery. The directors are Clevia J. Luther, Wasson, Ill.; Louis N. Parish and Robert Hargis, Harrisburg, Ill.

The Stout Furniture Co., Brazil, Ind., has been incorporated with $30,000 capital stock to manufacture furniture. The directors are Arthur L. Stout, Charles C. Rhetts and Samuel E. Stout.

The Jenkins Vulcan Spring Co., St. Louis, is to move its plant to Richmond, Ind., where factory buildings will be erected, following the taking of $100,000 of stock in the company by Richmond investors.

The Lexington Motor Co., Connersville, Ind., manufacturer of motor-driven and other vehicles, has incorporated with $1,800,000 capital stock. The directors are Andrew H. Rieman, Benjamin F. Thiebaud, Charles Cassel, E. Ralph Himelick and Allen Wiles.

The Weidely Motor Co., Indianapolis, has entered into a contract with the Cleveland Tractor Co., Cleveland, amounting to $3,000,000, to manufacture tractor motors for a period of three years. The Weidely company manufactures automobile and aeroplane motors. Edward Showers is president and G. A. Weidely is vice-president.

The Peerless Wire Goods Co., Lafayette, Ind., suffered a loss of $25,000 by fire Aug. 30.

The Butler Mfg. Co., which moved to Indianapolis from Knightstown, Ind., over a year ago, has increased its capacity 70 per cent, and will add to its equipment in the immediate future. It makes and grinds pistons and cylinders.

Cincinnati

CINCINNATI, Sept. 3.

Government orders have been placed quietly with a number of local manufacturing firms, but this does not represent all of the business that has recently been booked by machine tool builders. The Norfolk & Western Railroad Co. has been in the market, mostly through dealers, for a number of lathes and other machine tools. Prospective business from aeroplane manufacturers is large, and orders exceed the public's estimates. A firm in Erie, Pa., having a contract for aeroplane motors, is in the market for machine tools, including several lathes. Shapers are not in very good demand, but orders now in hand will carry makers over the remainder of the year.

The Cincinnati Building Commissioner's report for the month of August shows that the total building improvements figured over $300,000 below the corresponding month of 1916. The total cost for improvements, however, for the first eight months of 1917 is nearly $1,000,000 in excess of last year's estimate for the same period. The total for the eight months of 1917 is $8,374,820 and for 1916 $7,387,445.

The Carlton Machine Tool Co., Cincinnati, has finished the removal of its equipment from its plant in West End to its new building on Spring Grove Avenue.

The Reliance Engineering Co., Cincinnati, has awarded contract to the M. Marcus Building Co. for a three-story structure, 75 x 100 ft. Part of the building will be used as a garage, and a repair shop will be operated in connection.

The Monitor Stove & Range Co., Cincinnati, has let contract to the City & Suburban Building Co., for a one-story addition, 80 x 325 ft. This building will constitute the second addition to the Monitor plant made this year.

The proposed addition to the foundry of the Bauer Brothers Co., Springfield, Ohio, will be 80 x 150 ft., of steel and concrete.

The Kelly-Springfield Motor Truck Co., Springfield, Ohio, has plans under way for an addition to its plant that will enable it to greatly increase its output of motor trucks. The company recently received a Government order for 1200 trucks.

The Automatic Control Trailer Co., Columbus, Ohio, will add to its manufacturing facilities.

The Ebinger Sanitary Mfg. Co., Columbus, Ohio, is moving equipment into its new foundry and expects to have it in full operation within 10 days.

A report from the Long & Allstatter Co., Hamilton, Ohio, pioneer maker of punching and shearing machinery, shows that the demand is very good. The plant is working on full time and with a full force. Tentative plans are under way for building an addition.

The Columbus Steel Products Co., Columbus, Ohio, has been incorporated with $50,000 capital stock by S. A. Webb and others. Nothing is yet known as to the company's manufacturing plans.

A large repair shop will be fitted up in connection with the plant of the Ortman Motor Co., Washington Courthouse, Ohio, now nearing completion.

The new electric light and power plant at London, Ohio, will soon be in operation. It is reported that a number of small manufacturing plants in that city will be operated by electric motors in the future.

The Central Machine Shop, Urbana, Ohio, is a new partnership composed of William Foth, R. G. Jacobson and F. C. Berry. A shop will be installed to do repair work.

The Stowers Lumber & Mfg. Co., Harriman, Tenn., is inquiring for one 25 hp., 60 cycle, three-phase motor to operate at 900 r.p.m., and one 15 hp. motor to operate at 650 r.p.m., both for alternating current.

The Standard Stamping Co., formerly of Marysville, Ohio, is sending out notices of removal to a new location in Huntington, W. Va. The building is 110 x 200 ft., two stories, of day-light construction, equipped with every convenience for manufacturing. The location is three acres in extent, situated on the main line of the C. & O. Railroad in the heart of the city of Huntington.

The Bauer Brothers Co., Springfield, Ohio, maker of sugar and crushing machinery, will make an addition to its plant that will be 80 x 150 ft., one story, and of concrete and steel construction.

The Buckeye Steel Castings Co., Columbus, Ohio, is making extensions at its plant to handle an order recently received from the War Department.

The Central South

LOUISVILLE, KY., Sept. 3.

Business in this immediate locality is rather slow, but local houses are booking liberal orders from outside territories. Mill supplies and machinery lines are in good demand. A dearth of competent labor continues.

The Roy C. Whayne Supply Co., Louisville, is in the market for a 3-drum steam hoisting engine, 8 x 10 in. or larger, and is asking prices on a belt-driven air compressor with a capacity of 200 to 350 cu. ft. per minute.

The American Metallic Packing Co., Lexington, Ky., is in the market for a second-hand locomotive crane, specifications not stated.

The John G. Duncan Co., Knoxville, Tenn., is asking for dealers' prices on a second-hand, 6 to 8-hp., stationary horizontal or vertical engine.

Edith W. Cooper, 148 Fourth Avenue, Nashville, Tenn., is in the market for a ball or tube mill, 4 ft. in diameter and 6 to 8 ft. long.

The Standard Welding Co., Louisville, Ky., has been organized to operate a local plant. Christine G. Cottell heads the company.

St. Louis

ST. LOUIS, Sept. 3, 1917.

The local machine tool market, except for the urgent pressure of delivery of tools contracted for, is almost at a standstill, chiefly due to uncertainties as to the future and the inability to get equipment that might be needed. Plants which have taken over Government munitions contracts are equipped to handle them without adding to their machinery. The financial situation is very good, with money plentiful and comparatively easy.

T. S. Reed and others, DeRidder, La., will rebuild their electric light and power plant destroyed by fire, with a loss on machinery of $15,000.

The Yazoo & Mississippi Valley Railroad, Greenwood, Miss., A. H. Egan, Memphis, Tenn., general superintendent will build a power house and machine shop.

The Glover Machine Works, Marietta, Ga., is arranging for the construction of its new steel foundry and forge shop, to include a new electric furnace installation.

The Lake Charles Iron Works, Lake Charles, La., is planning for the construction of additions to its plant to cost about $25,000. The structures will include a one-story machine shop, about 60 x 100 ft.; blacksmith shop, 50 x 90 ft.; foundry, about 50 x 100 ft.; and locomotive repair shop, 30 x 50 ft. Frank Warren is general manager.

The Williams Mill Mfg. Co., Texarkana, Ark., has been incorporated with a capital stock of $100,000 by James Sedberry, H. M. Barney, and others, to build a foundry and machine plant.

The Geronimo Motor Co., Enid, Okla., will install a foundry for making malleable castings, utilizing gas heat.

The People's Refining Co., Ringling, Okla., E. D. Smith, Insurance Building., Oklahoma City, Okla., manager, will equip an oil refinery with four boiler stills, one steam still, two 125-hp. boilers, steam pumps, power house, etc., at a cost of about $65,000 for machinery.

The Fort Smith Metal Products Co., Fort Smith, Ark., has increased its capital from $50,000 to $100,000, and will install additional metal-working equipment.

The Tupelo Elevator Co., Tupelo, Miss., is receiving bids for elevator and grist mill machinery, as well as power plant equipment for a daily capacity of 40,000 bu.

The Sun Light Carbon Co., Ardmore, Okla., will equip a plant to manufacture carbon projectors, increasing its capital from $75,000 to $225,000.

The Uttz Mfg. Co., Kansas City, Mo., will equip a plant at Sapulpa, Okla., for the manufacture of automobile accessories and mechanical novelties.

Altus, Okla., will equip a waterworks pumping station and distributing plant at a cost of about $400,000.

Lafayette, La., F. E. Girard, mayor, is receiving bids for a sewage disposal plant including settling tank, contact beds, sludge bed, emergency pumping station, etc.

The Unit Contruction Co., contracting engineer, Title Guaranty Building, St. Louis, has been awarded contract for the design and construction of a reinforced concrete trestle and ore bins for the St. Joseph Lead Co.'s smelter at Herculaneum, Mo., to cost approximately $150,000.

Texas

AUSTIN, Tex., Sept. 1.

The machinery and tool trades show improvement over what they have been for the last two or three years.

H. Wagner & Sons, San Antonio, have been incorporated with a capital stock of $15,000 to manufacture doors and sashes, etc. R. L. Evans, San Antonio, is a stockholder.

The Stone Tractor Mfg. Co., Quincy, Ill., which has a capital stock of $100,000, has opened offices at Texarkana preparatory to starting construction work on its proposed plant for the manufacture of tractor and farm machinery.

S. Sinsheimer, general manager of the Holly Sugar Co., Holly, Col., and other officials, have finished an investigation of the Rio Grande valley around Las Cruces, N. M., with a view of selecting a site for a beet sugar factory to cost upward of $1,000,000. The proposed plant will be ready for operation in time for next season's crop.

The Fulshear-Simonton Gin Co., Fulshear, will construct a cotton gin to cost about $36,000. W. P. Winner is a stockholder.

The Universal Shipbuilding Co., Wilmington, Del., which has a capital stock of $400,000, has opened offices at Houston preliminary to constructing a shipbuilding plant upon the Houston ship channel.

Tom Ditte and B. B. Struance, Fort Worth, who recently purchased the flour mill and elevator of the Amarillo Mill & Elevator Co., Amarillo, will install new machinery and enlarge the capacity.

California

LOS ANGELES, Aug. 28.

The Llewellyn Iron Works, Main and Redondo Streets, Los Angeles, specializing in the manufacture of elevators, tanks, structural steel, etc., will erect a new one-story pattern shop, about 100 x 100 ft., at 1312-16 Magdalena Street.

The California Shipbuilding Co., Long Beach, operating the former Craig ship works, has secured options for the purchase of property, about 600 x 800 ft., in the vicinity of its present plant, and is said to be planning for the construction of extensions. A contract has been secured from the Government for three steel freighters, each of 6000 tons rating, and about 345 ft. long, at a price of $930,000 each. George H. Bixby is president.

The Atchison, Topeka & Santa Fe Railroad Co., Kerckhoff Building, Los Angeles, has awarded contracts for the construction of new repair shops and sheds at San Bernardino, to cost about $47,000. The Cresmer Mfg. Co., Riverside, is the contractor.

The Fontana Power Co., Fontana, Cal., will build a new hydroelectric power plant in Lytle Creek Canyon, near Rialto, with an initial capacity of about 15,000 kw. McKeen & Miller, Monadnock Block, Chicago, are the engineers.

Benjamin F. Graham, Title Guarantee Building, Los Angeles, is organizing a company to construct a shipbuilding plant at San Diego. An option for a lease of about 6 acres of tidelands, near Twenty-eighth Street, has been secured.

A portion of the plant of the Hanford Mfg. Co., Hanford, Cal., manufacturer of pumping equipment, etc., was recently destroyed by fire with loss of about $30,000.

The Southern Sierras Power Co., Riverside, Cal., has secured a 50 year franchise at Blythe, and plans for the construction of a new electric power plant.

The Pacific Northwest

SEATTLE, Aug. 28.

The threatened strike in Seattle shipbuilding plants again seems probable. More than 16,000 men are included in the unions and it is now believed only Government action will prevent the walkout. One of the large plants and two or three smaller shipbuilding yards and foundries have met the demands of the men.

With production 42 per cent of normal, and sufficient to meet requirements of the market, Washington lumber mills now closed will not resume operations until after Jan. 1, unless the Government places further orders for wooden ships. This decision is due to a sudden reversal in demand almost without parallel in the industry.

The usual difficulty in securing machinery and equipment is being felt by manufacturers in this section. Several large shipbuilding plants, to escape the long delays attendant upon securing necessary machinery, have purchased foundries and iron works, and consolidated them with the ship plants. Notwithstanding labor troubles in the lumbering industry, a lively demand has sprung up for planing mill and logging machinery. There is a very active demand for second-hand lumber machinery, and numerous old mills are being dismantled, partly for scrap and partly for repair and use. The demand from the shipyards is now largely for small wood-working tools.

The Pacific Power & Light Co., Portland, Ore., will build a new central switching station, to cost about $100,000, at Pasco, Wash., for a 66,000 volt system.

Plans have been completed for the plant to be built by the Northport Mfg. Co., Northport, Wash., to cost $30,000, for the manufacture of keyhole saws.

The Patterson-McDonald Shipbuilding Co., Seattle, has completed plans for its machine shop, 80 x 230 ft., to be built at a cost of $15,000. Plans for other buildings are under way.

The Puget Sound Traction, Light & Power Co., Seattle, contemplates the expenditure of between $400,000 and $500,000 in enlarging its plants and converting them from oil to coal burners. Plans have been completed for the construction of a five-story addition to its power plant at Western Avenue and University Street, to cost $200,000. The machinery will cost $150,000.

The Erickson Engineering Co., Seattle, has been organized by C. J. Erickson, Downs Block, C. E. Erickson and Charles M. Burnett, with capital stock of $2,100,000, to build ships at its plant established on the Duwamish River.

H. M. Rothweiler, Seattle, will be at the head of a firm which contemplates the construction of a one-story screw, nut and bolt factory, 40 x 135 ft. Plans have been prepared.

The Foundation Co., New York, has announced its intention of establishing a shipbuilding plant at Portland and at Vancouver, Wash., to build wooden ships for the Government.

The Salem Iron Works, Salem, Ore., operated by Shand & Marcus, has been sold to Patterson & McDonald, shipbuilders, Seattle, who will transfer the mechanical equipment.

Waitsburg, Wash., will construct a municipal water system to cost $50,000.

The Pacific Lifeboat Co., Portland, has contracts on hand which will keep its force of 50 men busy for two months. It will add a plant for the construction of ventilator equipment.

The foundry of the Monarch Iron Works, Spokane, Wash., was destroyed by fire recently, with loss of $5,000. Hubert C. Smith and Martin Goodwin, owners, state it will be rebuilt.

The Puget Sound Pulp & Power Co., Seattle, organized with a capital stock of $16,000,000, contemplates the construction of a paper mill and power plant in the Puget Sound district.

The Idaho-Portland Cement Co., Pocatello, Idaho, contemplates the immediate construction of a cement plant. D. C. Eccles, Ogden, Utah, is chairman of board of directors.

The Hawley Pulp & Paper Co., Oregon City, Ore., contemplates building operations to cost $750,000, which will provide for further enlargement of its plant.

The sawmill of the Appendorff Lumber Co., Sherwood,

Ore., was recently completely destroyed by fire, with a loss of more than $50,000.

Plans have been completed by the Wilson Shipbuilding Co. for its plant at West Lander and Twenty-sixth Avenue, which include a one-story building, 26 x 40 ft.; compressor shed and sawmill, costing about $15,000.

The Thermit Welding & Modern Torch Co., Seattle, has recently been organized by Portland and Seattle capitalists, and has established a factory and salesroom at 413 Railroad Avenue, South, under the management of Thomas A. Errett. It will manufacture welding and cutting equipment, torches, etc.

The Elliott Bay Yacht & Engine Co., Seattle, is building two new sets of marine ways, which will enable it to go into repair work on an extensive scale.

The Foundation Co., New York, has acquired a 50-acre tract on the tideflats in Tacoma, on which will be erected a plant for the construction of ships for the French Government. Ten to 12 ships will be built at a time.

The Columbian Bronze Corporation, Seattle, Wash., with which the Columbian Brass Foundry was recently merged, is building an addition to the plant and has authorized the construction of another. The company is working on underwater fittings and propellers for submarine chasers for the Government and also has contracts for work for the Allies.

The Western Canada Shipyards, Ltd., Vancouver, B. C., will erect a shipbuilding plant.

The Vancouver Shipyards & Engine Works, Ltd., Vancouver, B. C., announces plans for the erection of a shipyard and machine shop.

The Denine Air Craft Co., Inc., Spokane, Wash., has erected a plant at Yardley, near Spokane, for the construction of J. N. 4 Curtiss tractor type biplanes.

The Buehner Lumber Co., North Bend, Ore., will install two fast feed planers, two moderate speed planers, a timber sizer for handling shipbuilding material and a large traveling crane.

Canada

TORONTO, Sept. 1

A decided falling off in activity in the munitions industry in Canada is noted. Fewer contracts for shells are being placed, and the output has declined. Various munitions factories have responded to the order of the Imperial Munitions Board to cut their output in two and as a result have laid off many employees. The only persons assured of steady employment in this line are the skilled mechanics and the highly efficient workmen. Many plants have laid off or given some other form of employment to their shell and fuse makers, and machine shops in a number of cases are turning their attention to other classes of work. The building of marine engines and auxiliary equipment for ships is developing rapidly and promises to form an important industry. There is a general feeling that the shutting down of munitions orders in the Dominion has been done partly to release money that could be expended on shipbuilding, which will mean an extensive enlargement of the previous activities of the Imperial Munitions Board. This work will create a new demand, not only for nuts and bolts used in hull construction, but auxiliary equipment, such as engines. In this connection it is stated that the Dominion Bridge Co., Montreal, proposes to go into the construction of marine engines on a very large scale in the near future. The feature of the machine tool market is an increasing demand for tools for general purposes, which is replacing the former activity in equipment for munitions. A large Toronto machinery house reports a big demand for tractors and farm oil engines, due largely to the scarcity of labor. The Willys-Overland Co., Toronto, is equipping a factory for building aeroplane motors, and has purchased a number of machine tools.

The Three Rivers Shipyard Co., Three Rivers, Que., plans to spend $125,000 on a new shipyard, and is in the market for a 15-ton electric crane; 15 to 75-hp electric motor; large B.C. fir lumber band saw working at angle; 16-in. planer; air compressor or blocking.

The Normandy Tire & Rubber Co., Ltd., 413 Canadian Pacific Railroad Building, Toronto, will build a plant at St. Catharines, Ont.

Fred F. Ferguson, care the Canada Iron Foundry, St. Thomas, Ont., has secured premises at Walkerville, Ont., where he will install equipment for the manufacture of castings, etc.

George Reid, 262 Central Avenue, London, Ont., is interested in a company which has been organized for the manufacture of rubber tires, etc. It is the intention to erect a plant at London.

The Steel Company of Canada, Hamilton, Ont., proposes to install a department for the manufacture of steel plates for ships, and to build a sheet metal plant.

Grant Smith & Co., Victoria, B. C., are contemplating the erection of a shipbuilding plant at Victoria.

The Town Council of Portage la Prairie, Man., will install a 100 h.p. boiler with mechanical stoker in its electric station at a cost of $5,000.

The Canadian National Carbon Co., Toronto, will build a power house.

The Murray Engines, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $25,000 to manufacture machinery, tools, etc.

The Merchants Shipbuilding Corporation, Ltd., has been incorporated with a capital stock of $500,000, and will establish a shipbuilding plant at Vancouver, B. C.

Plans are being prepared by J. M. Smith, Montreal, engineer for the St. John Shipbuilding Co., which will build a plant at St. John, N. B. It is reported that plans will be completed and tenders called for the erection of building in a few weeks.

The Globe Engineering Co. has been incorporated with a capital stock of $100,000 and will take over the assets and liabilities of the Globe Electric Machine Co., Hamilton.

The plant of the Winnipeg Foundry Co., 115 Robinson Street, Winnipeg, Man., damaged by fire some months ago with a loss of $50,000, will be rebuilt. New equipment will be purchased.

The Vancouver Shipyards & Engine Works, Vancouver, B. C., recently incorporated with a capital stock of $750,000, will establish a shipbuilding plant near the Second Narrows on the Vancouver side of the harbor, and employ 500 men at the start. Contracts for the preliminary work have been let. It has secured orders for a number of wooden vessels and will also build steel ships. S. Matheson, Roges Block, Vancouver, is interested.

The North Shore Iron Works, North Vancouver, B. C., has started work on extensive additions to its plant. New equipment will be installed.

The Chicoutimi Pulp Co., Chicoutimi, Que., will build an addition to its plant, including the erection of a machine shop.

The Cluff Ammunition Co., Sterling Road, Toronto, whose plant was destroyed by fire several months ago with a loss of $150,000 will rebuild.

The Toronto Coal & Dock Co., Ltd., Montreal, has been incorporated with a capital stock of $100,000 by William K. McKeown, Leopold Choquette, George E. Chart and others to build ships, docks, etc.

The Canadian Hession Tillers & Tractors, Ltd., Toronto, has been incorporated with a capital stock of $5,000,000 by Henry D. Petrie, Alexander M. Snyder, Adam H. Hope and others to manufacture tractors, farm implements, tools, etc.

The Fruit Machinery Co., Ltd., Belleville, Ont., has been incorporated with a capital stock of $40,000 by Robert J. Graham, Sidney, Ont.; Frank B. Foley, Ingersoll, Ont.; George K. Graham and others, Belleville, Ont., to manufacture machinery, tools, implements, etc.

The Midland Shipbuilding Co., Ltd., Midland, Ont., has been incorporated with a capital stock of $1,000,000 by Norman L. Playfair, Marcus Smith, Thomas C. Luke and others to build ships and manufacture machinery, etc.

Powell-Kelly, Ltd., Toronto, have been incorporated with a capital stock of $150,000 by Walter C. Powell, Thomas R. Kelly, John P. Standish and others to manufacture leather goods, trunks, etc.

The Smith Motor Truck Corporation, organized under the laws of the State of Virginia, with a capital stock of $40,000 has been granted permission to manufacture motor trucks, automobiles, vehicles, etc., in Ontario. M. A. Stratton, Toronto, Ont., is the attorney.

The Canadian Linderman Co., Ltd., Woodstock, Ont., is in the market for a 10 hp., three phase, 25 cycle, 750 r.p.m., 550 volt motor.

The St. Mary's Wood Specialty Co., Ltd., St. Mary's, Ont., is in the market for Robb-Corliss engine, about 75 hp., also shafting, hangers, etc.

The Unit Construction Co., contracting engineers, Title Guaranty Building, St. Louis, will design and construct an addition 600 x 130 x 70 ft. to the power house of the Cedars Rapids hydro-electric development, at Cedars, Que. The construction will be of structural steel and reinforced concrete, and will cost approximately $250,000.

The Dominion Carriage Co. has obtained a charter with capital of $500,000 to manufacture carriages, automobiles, etc., with headquarters in Montreal, where a factory is now under construction. The promoters are P. T. Legaré and J. H. Fortier, Quebec, of P. T. Legaré, Ltd., jobber of carriages and agricultural implements. The managing director will be Fred Arthur, Montreal, who was general manager of the Heney Carriage & Harness Co.

Turbo Units Versus Gas Engines

(*Continued from page* 543)

flames, and the gas burners must be arranged to give the proper proportions of air and gas and the proper mingling of the air and gas. Recent developments with burners arranged to bring the pressure of the gas up to the outlet and designed to give an intimate mixture of air and gas before entering the furnace have shown that higher furnace temperatures can be maintained than in the older practice and that the gas can be burned with a shorter flame than in certain of the older forms of gas burners. Higher furnace temperatures and the ability to burn the gas within a given furnace volume and the proper design of the boiler and its economizer make it possible to obtain this efficiency.

In the gas engine high efficiencies are obtained at the high temperature end of the cycle, but not at the low temperature end, while in the steam turbine with the modern condensing apparatus the low temperature end of the cycle is utilized to the fullest extent. It would appear, therefore, that there are great possibilities in combining the two. On working out an actual case it will be found that the work of the steam turbine would be comparatively small, amounting to say 10 per cent of that of the gas engine, and the large amount of additional expense and complication involved would offset the saving in the cost of fuel unless the fuel is comparatively expensive.

Alex Dow, president Detroit Edison Co., confirmed the statement that sustained boiler house efficiencies of 81 to 82 per cent are possible, economizers being used. The Detroit Edison Co. has a boiler house efficiency of 76 per cent, all losses by banked fires included, etc., without economizers. Low turbine efficiency is often caused by badly designed and badly managed boiler houses, by poor condenser practice and by neglect of station heat balance, the usual fault of heat balance being an excessive or careless use of steam auxiliaries; the less frequent fault being making a fad of electric auxiliaries.

The following are operating cost figures for the Connors Creek Station, which has three 20,000-kw. turbines. The difference between the July to June costs and the January to December costs is due to the disturbance of coal supplies and costs in the last weeks of 1916. The same cause, together with the increased use of heat in the buildings during the winter months, has affected the three months' costs, January to March, 1917.

Connors Creek Power House Production Expense

Twelve Months Ending June 30, 1916	
Kw.-hr. output	125,158,800
Maximum demand (30 min.), kw.	35,000
Average load, kw.	14,300
Load factor	.409
Coal per kw.-hr.—lb.	1.44
B.t.u. per kw.-hr.	19,700
Operating expense per kw.-hr.	.248c
Twelve Months Ending Dec. 31, 1916	
Kw.-hr. output	162,117,600
Maximum demand (30 min.), kw.	36,000
Average load, kw.	18,500
Load factor	.514
Coal per kw.-hr.—lb.	1.45
B.t.u. per kw.-hr.	19,800
Operating expense per kw.-hr.	.262c
Three Months Ending March 31, 1917	
Kw.-hr. output	54,654,900
Maximum demand (30 min.)	45,000
Average load, kw.	25,300
Load factor	.562
Coal per kw.-hr.—lb.	1.56
B.t.u. per kw.-hr.	20,300
Operating expense per kw.-hr.	.360c

The figures are for current actually metered out at the transmission voltage of 23,000 to 25,000 volts. They should not be compared with figures of current generated, whereof part is used for station purposes.

They represent a design of the years 1913 and 1914, and a balance between investment costs and operating costs based upon fuel of 13,500 heat units costing $2.40 per net ton. For fuel at $5, which seems to be the probability, the company would buy turbines which would require about 9 per cent less steam than the Connors Creek turbines, and which would be nearly as reliable. It would install economizers, and thereby bring the maintained boiler room efficiency up from 76 per cent to 81 per cent, and would make certain other refinements in its heat balance which might save 1 per cent of the total fuel. The result of these changes would be a reduction from a normal use of 19,700 heat units per kw. hr. to something like 17,000 per kw. hr. of net output.

Domestic Lead Output in 1917

The U. S. Geological Survey has just completed a mid-year canvass of lead production. According to the compiler, C. E. Siebenthal, the output of domestic desilverized lead, excluding desilverized soft lead, was 152,231 net tons for the first half of 1917 against 158,235 tons for the same period in 1916. The output of domestic soft lead, including desilverized soft lead, was 124,292 tons and the output of lead produced from foreign ores and bullion was 29,539 tons to July 1, 1917, as compared with 117,879 tons and 9453 tons respectively for the same period in 1916.

In view of the scarcity of lead, the increase in lead of foreign origin is regarded as encouraging. The greater part came from Mexico. According to the records of the Bureau of Domestic and Foreign Commerce, the total lead imported in the first six months of 1917 was 30,620 tons (17,665), of which 22,507 tons came from Mexico (12,099), and 4569 tons came from Canada (3153), the figures in parenthesis being those for the same period in 1916. The exports of domestic lead amounted to 29,241 tons (50,283) and of foreign lead 6066 tons (4940). The total exports of lead were 38,577 tons (57,808). Disregarding stocks, the apparent consumption of lead in this country in the six months was 268,952 tons (230,587).

The production of new antimonial lead was 7822 tons (12,019), and of secondary antimonial lead 1959 tons (2065). The output of secondary pig lead by regular ore smelters was 7578 tons (5548). The average outside spot price of lead during the six months' period was 9.9 cents a pound, as against 6.9 cents in 1916.

Converter Explosions in German Steel Foundries

Small explosions in German converter steel foundries are referred to by a writer in *Stahl und Eisen*, as reported in a recent issue of the London *Iron and Coal Trades Review*. These explosions generally occur with over-blown charges. The writer mentions a recent case in his own experience. A charge was finished in about eight minutes, but as the metal was too sluggish for teeming, the shop manager decided to continue the blowing. The after-blow having lasted four minutes, the characteristically green flame, with small illuminating power, made its appearance and small pellets of slag began to spatter out. The converter was then turned down and the finishing iron added, when in about 15 seconds the charge began to burst into flames, at first slowly, then more rapidly, and a series of small explosions took place, which scattered lumps of slag to a distance of over 30 yards. The explosions, according to the writer, are the more violent the more the charge has been over-blown, and he thinks the behavior of the metal is due to the well-known reaction of the ferrosoferric oxide in the slag upon the carbon in the finishing iron.

Plans have been filed with the Canadian Government by a law firm of Windsor, Ont., acting for the Canadian Steel Corporation, for docks at Ojibway, Ont., to cost $250,000. The plans include a marine slip, harbor, docks, wharves.

The Hyatt Roller Bearing Co., Newark, N. J., has opened a branch office in Pittsburgh at 1273 Frick Annex Building. E. E. Eby and J. M. Kelly will represent the company in that territory.

Planning Department in Modern Shops

(*Continued from page* 537)

the workman's number, to furnish the payroll department with the total time spent in the shop; from which the payroll is made up, and by reassorting the tickets by charge symbol, it is an easy matter to get the total time spent on the job, from which the cost clerk makes up his cost card.

The Cost Clerk.—The cost department is the fulcrum of the operation of the function of record. It is the work of the cost department to collect, classify, analyze and compare all the operation costs in the plant. A comparison of the unit costs furnishes a measure of the progressive efficiency of the manufacturing departments. An analysis of the unit material costs is an accurate index of the effect of the fluctuating cost of materials on the units of manufacture; an analysis and comparison of the total individual costs supply a scientific basis for the fixing of selling prices. The function of the cost department is that of the balance wheel. When actual costs exceed the estimate or standard, it is the cost department that discovers the fact and sounds the warning. It is the cost department that keeps the overhead under surveillance and analyzes, each period, the departmental charges and keeps them at the minimum.

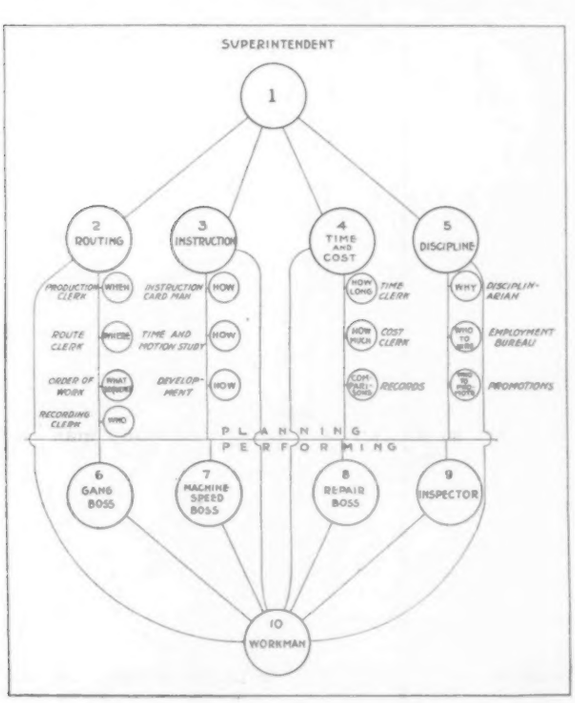
Statistician.—A number of large, complex organizations have found it to their advantage to institute the office of statistician. His duties cover a wide range, and the results of his studies are very valuable data in determining general questions of policy. His function is clearly that of record.

The Function of Discipline

The disciplinarian, the employment bureau and the supervisor of promotion constitute the function of discipline.

Disciplinarian.—The disciplinarian, instead of being a shop policeman keeping tabs on the workmen, as one might infer from his title, is, in reality, the workmen's best friend. He is the maintainer of the square deal—the impartial court of appeal to whom all disputes between the individual workmen, and between the workmen and the executive division, may be referred for a just and equable decision.

The Employment Bureau.—The function of the employment bureau under scientific management is one of the cardinal features of the science. Not merely to hire a man, but to place him in a position for which he is fitted, is the obligation of the employment bureau. The employment bureau is the purchasing department of human power, and it should be realized that the same general principles govern both the purchasing department of materials and the purchasing department of labor. The purchasing department of materials buys to fill certain definite specifications, which in turn are determined by the use to which the material is to be put. The employment bureau has at hand very similar specifications as a guide to the solution of efficient employment. There are certain definite characteristics of every job which require certain definite qualities in the workman to properly fill it. The human factor in management is a big psychological study, the depths of which have not yet been sounded, and the importance of this function, unfortunately, has not yet been fully recognized. No single function is of greater importance than the placing of the round pegs in the round holes, the efficient distribution of the labor in the plant.



The Four Managerial and the Four Shop Functions Under Scientific Management

The Supervisor of Promotion and Welfare Manager.—The supervisor of promotion, the director of personnel—whatever you may choose to call him—is the recorder of the activity of the individual workman. It is he who determines the line of advancement according to the qualifications of the individual. It is he who indicates when promotion and increased pay is justifiable. It is he who has charge of the apprentices and arranges their course of study and their program of work. It is he who has charge of the corporation school and acts as adviser to the men who wish to take advantage of the opportunities it offers. It is he who co-operates with the public school system and arranges the part-time work. It is he who has charge of all welfare work and serves as the agent of the management in arranging the various social, educational and athletic activities.

Taken as a whole, the function of discipline, as we shall call it for the sake of maintaining a uniformity of terms, is the function of humanizing industry, the co-ordination of the purely industrial factors with the social, educational and athletic factors—the attempt, at least, to realize some of the better of the socialist ideals, a step in the direction of a true state of co-operation, of co-partnership between the management and the men. While the function of discipline borders on the division of control, in essence it is purely that of record.

Shop or Productive Division

The Gang Boss.—The first of the main shop functions is that of the gang boss. Very similar to the traditional foreman, the gang boss is the agent of the planning department in the shop. It is his duty to maintain the schedule as determined by the route clerk, the production clerk and order-of-work clerk. It is his duty to see that the workman is supplied with the proper materials, tools, drawings, instructions, etc., and that the work is lined up ready for the workman before he is ready to start. He is the traditional foreman with certain of his duties minimized and certain phases of his work emphasized. His function is largely that of preparation but contains also an element of control.

The Machine Speed Boss.—The machine speed boss might well be characterized as the inspector of method. It is he who checks the speeds and feeds used, against those called for on the instruction card, and thereby maintains the planning department standards. It is he who acts as assistant and teacher in the event of a workman's not understanding how to do the work, and in this capacity he is the planning department's demonstrator. From the point of view of maintaining standards, the function of the speed boss is that of control.

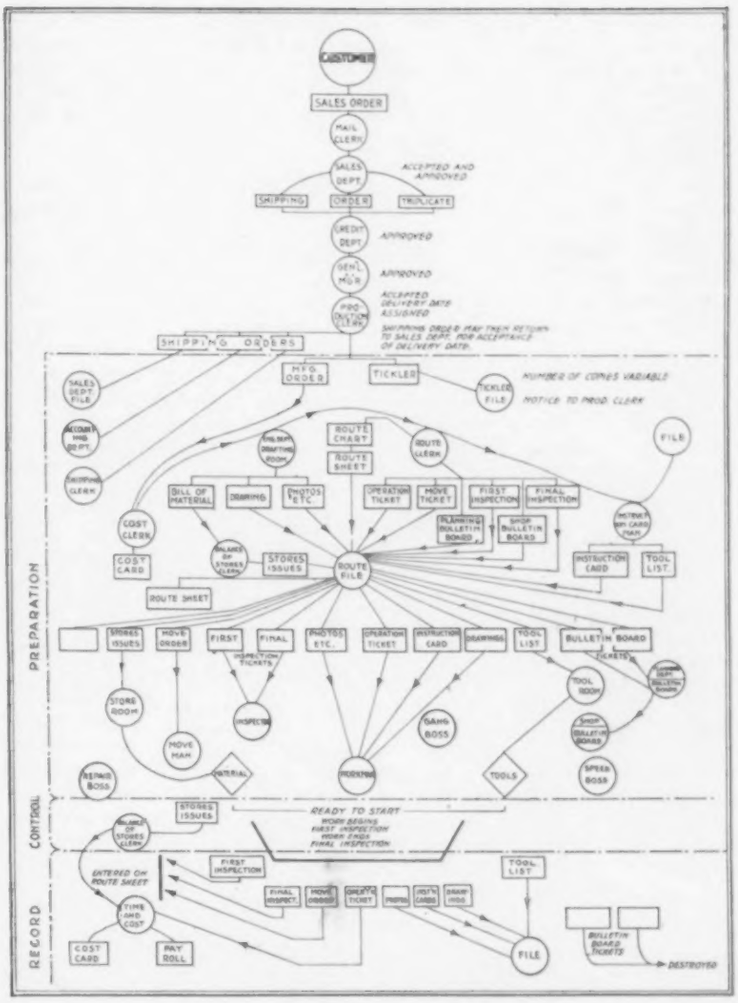
The Repair Boss.—The repair boss is the exponent of the philosophy that "an ounce of prevention is worth a pound of cure." Not so much to repair in the event of a breakdown as by frequent inspections and minor repairs to prevent breakdowns, it is the function of the repair boss to maintain the equipment at its maximum efficiency, thereby greatly increasing the possibility of executing the shop schedule as planned. The function of the repair boss is indeed universal preparedness and

as such can only be classified under the division of preparation.

The Inspector.—The inspector serves a two-fold purpose. He performs the traditional final inspection of quality, and, in addition, makes a first inspection of method. In this first inspection, a development accredited to A. R. Shipley, he is also an exponent of prevention. The first inspection consists of the inspection of the first few pieces done by the workman, to be certain that the method is clearly understood and that the first few pieces are properly done. The importance of this function of first inspection cannot be overestimated, as it is a vital factor in the prevention of poor work, thereby reducing the amount of waste material, and in the elimination of disputes based on the ground that the workman did not understand his instructions. It is not an obvious classification, but it would seem that the first inspection might best be relegated to the division of control, while the final inspection is without doubt a subdivision of record.

Sub-Functional Divisions in Operation

The sub-functional divisions as treated in this paper are more or less arbitrary. It must be realized that the divisions are extremely flexible and easily adapt themselves to the requirements of the individual shop. For example, it is very easy to conceive of a shop where the entire function of routing could easily be handled by one man, while on the other hand there are many plants where it would require the services of one man to fill each of the sub-functions of production clerk, order-of-work clerk, and recording clerk. In one plant, a single cost clerk might suffice, while in another a department of fifty or a hundred clerks and assistants might be necessary. Each function does not mean a separate official, nor is it to be understood that every man performs, necessarily, only a single function. One might perform several functions, while it is equally obvious that a single function might require the work of several men.



Handling an Order Under Scientific Management

The Requirements of Functional Foremen

The proper selection of the functional foreman in the planning department is of great importance to assure the maximum results from its institution. It is a difficult thing to lay down any hard and fast rules governing the qualifications the various foremen should possess, but it may be well to outline, briefly, the education and training which, in a general way, the incumbents of the main functions should possess.

The Production Clerk.—The production clerk need not necessarily be a factory-man. He is not concerned particularly with technical manufacturing problems nor does he come in direct contact with the workmen. He might, if need be, be an outside man and should be of the executive type, since it is he who has charge of the planning department and determines the order of the work.

The Route Clerk.—The function of route clerk is essentially one which demands a rather comprehensive factory training and experience with the individual manufacturing problems of the factory in which he is working. He must be particularly conversant with the plant layout and the available equipment, in order to intelligently determine the routing of the work.

Order-of-Work Clerk and Recording Clerk.—The functions of the order-of-work clerk and the recording clerk are largely clerical, and while a short experience in the shop would be of undoubted value, it is not a necessity and it is possible for a boy in his teens to be trained satisfactorily for the job.

Instruction-Card Man.—The function of instruction like that of routing demands practical factory experience and training, and the instruction-card man should be chosen from among the shop's most experienced foremen or workmen, with particular regard for his ability to analyze methods of operation. The functions of routing and instruction are the two demanding the largest amount of technical factory experience and should be chosen with a great deal of care. It has well been said that the route clerk and the instruction-card man should be big enough men to be chosen superintendents. Above all, they should be chosen because of striking characteristics in their temperaments conducive to the efficient execution of their functions.

Time Man and Motion-Study Man.—At the outset of the installation of scientific management, it is without question the safest course to secure the services of the best man. Time study is essentially a technical question, and motion study is a science in itself. It is a question whether or not it is economical to attempt to train a motion-study man from the ranks, and it would almost seem better to retain the services of an expert, even after the work of installation is well under way. It is not so difficult to train a time-study man or a rate-setter, and in many cases this has been very satisfactorily done. It is a question of measurement to determine the best course to pursue—the main factors being (1) the man available for such training; (2) the amount of work to be done.

Time and Cost Clerk.—The work of the time and cost department is purely clerical and demands primarily a knowledge of the essentials of factory costs and their use. There is little or no demand for factory experience, and it is possible to utilize a man from outside, if a suitable one is not to be found in the existing organization.

Disciplinarian.—The primary requisites of the function of disciplinarian are (1) a judicial point of view; (2) the strength of purpose to execute fearlessly his conception of right determined by a keen sense of justice; (3) an inherent sympathy, born of a true understanding of the workman and his point of view; and (4) a man who naturally and without studied effort, commands the respect, the good will and confidence of the men. The function of disciplinarian is not an easy one to fill, and perhaps that fact, partly at least, may account for the rather limited use, thus far, of that function. Very seldom is it wise to take a man from the existing organization. He is unconsciously prejudiced by tradition.

Employment Bureau.—The scientific selection and training of the workmen is one of Taylor's cardinal principles of the science of management. So large a question it is we can do no more than outline its fundamentals in passing. The selection and training of the workmen under scientific management is very nearly a science in itself, and in its many ramifications embraces a well-founded knowledge of psychology, anatomy and pedagogy. It, too, is a function to be filled by an expert who has made a long study of the question. Very large salaries are to-day being paid and some excellent work is being done along this line by several large organizations, and the indications are clear for a wider and a more comprehensive extension of the movement in the very near future.

To fill the four main functions in the shop, the gang boss, the speed boss, repair boss and inspector, every effort should be made to utilize men from the existing organization. Each one of these functions demands in a varying degree, practical experience in the particular shop in question, and usually little or no trouble is experienced in finding satisfactory men for the places.

Path of a Manufacturing Order

The sales order from the customer is accepted by the sales department, passed by the credit department, approved by the general manager or officer designated by him, and is then transferred to a manufacturing order form if the goods are to be manufactured. This order is then approved by the production clerk, accepted, placed on the manufacturing schedule and assigned a date of delivery. It may then return to the sales department for their acceptance of the shipping date, but not necessarily so.

The next step takes the order to the engineering department and drafting room, where the drawings are prepared and the bill of material drawn up. The order itself remains long enough with each division only to allow the head of the department to make a note of it and is then filed for the reference of the whole organization.

Leaving the drafting room, the order proceeds to the instruction division. Here the instruction cards are prepared, the rates set and the tool list made out while the order has passed to the routing division. And here are prepared the route charts, the route sheets, the operation tickets or job cards, the bulletin-board tickets, the inspection tickets, the move tickets, stores issues, etc.

From the drafting room are received the drawings, photographs and the bill of material, which in the meantime have passed through the other divisions for inspection and for aid in making up the remainder of the form. The bill of material has formed the basis for the preparation of the stores issues, by means of which, in turn, the materials in stores have been apportioned or reserved for the order, and special materials, not carried in stock, have been ordered by the purchasing department from the outside.

The instruction cards and tool lists passed on to the route clerk have served as a basis for the preparation of the various tickets. In fact, the work of each function is carefully tied up with the work of every other.

Up to this point, the work has been purely that of preparation. The next step is that of the control and direction of the work while in process. The route file division is the point of convergence of all of the factors. To the route file, awaiting their issuance, come all of the drawings, lists, tickets, etc., as they are prepared by the different functional foremen, so that finally we have centralized in one folder or group of folders in the route file, indexed under the manufacturing order number, all of the data relating to that order, and we are ready to start the production factors moving in the shop.

In the meantime, perhaps, in anticipation of its actual entry into the shop, as a sort of advance notice to prepare the way, the bulletin-board tickets have been placed on the bulletin-board, on the lower or third set of books—work to be done ultimately at that machine but not yet completely prepared. When the order-of-work schedule releases the order, a stores issue slip is sent out with a move order, and the material or materials are issued by the storeroom and sent by the move man to the machine or workplace where the work is to be done. At the same time the tool list goes to the tool room and the tools are issued and the drawings, photos, etc., are sent direct to the machine. Everything is ready to begin work. The bulletin-board tickets are separated, the shop copy going to the shop bulletin-board, and the planning department copy moved to the middle or second set of hooks, for jobs ready to start.

We are now all ready and waiting for the workman. When he finishes the job on which he has been working and stamps in his ticket, he is ready for us and he then receives his new job ticket, stamped "out" or "issued." At the machine are his tools, materials, drawings, instructions, etc. In the meantime, the first inspection ticket has gone out to the inspector, the gang boss has the bulletin-board ticket notification and has checked materials, tools, etc., the job is ready and the workman, with the gang boss and inspector, starts the work. The first inspection over, the workman proceeds, unhesitatingly confident in the assurance that he thoroughly understands the specifications and supported by the knowledge that he has a corps of expert advisers to call upon in the event of any unforeseen condition developing during the process. One by one all of the different operations are controlled and directed in this manner, until finally the order is completed ready for shipment, and with the end of the processing comes the end of the division of control.

The work finished, we immediately become interested in the score. Have we won or lost? And this takes us into the division of records. The stores issue slips returning as filled are deducted from the stores on hand by the balance of stores clerks and go to the cost department for record. The operation tickets, move tickets, etc., every record of production time, return to the time and cost department for record, while the drawings, lists, photos, etc., return and are filed as a record for future reference. The cycle is complete and with the man's pay made up we have a record of his work measured by his having made or lost his task, and with the complete cost of the order we have the final score—the actual cost against the estimated cost and the margin of profit.

The J. R. Stone Tool & Supply Co., Detroit, distributers for the Manufacturers Equipment Co., Chicago, and the Nelson-Blanck Mfg. Co., Detroit, have opened an office at 30 Church Street, New York, under the direct management of J. R. Stone, president of the company. The Manufacturers Equipment Co., Chicago, makes air chucks and the Nelson-Blanck Mfg. Co., Detroit, manufactures multiple spindle drill heads and drill presses. Several salesmen will travel from this office throughout the eastern states.

The Capital City Iron Works, Olympia, Wash., according to H. H. Piper, manager, will be in operation by Oct. 1. A 3-story building, 60x130 ft., is under construction, and an electric steel furnace will be installed early in October. Steel castings will be furnished to the shipyards of Tacoma, as well as the Sloan Shipyards of Olympia, which own the plant.

The new blast furnace of the Whitaker-Glessner Co. at Portsmouth, Ohio, has been put in blast, and will make from 500 to 550 tons of metal per day.

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